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Shaping Comparative Advantage

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edited by
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and
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Introduction*

In the highly competitive international trading environment of the late 1980s, governments are adopting trade and industrial policies that seek to influence a country's pattern of economic activity. Governments employ some policies to help desired industries to become profitable. They use others to protect existing industries against foreign competition, even if those industries sometimes are no longer profitable.

Such intervention, while popular among policymakers, has stimulated considerable debate in the economics community about the question of whether the benefits exceed the costs, and if so, when. Two major fields of theoretical and policy research have a bearing on the debate: international trade and industrial organization.

A group of researchers within the field of industrial policy belonging to what is sometimes called the "industrial policy school" have reached conclusions and recommended policy approaches that appear to differ substantially from those of researchers whose work is in the mainstream of trade and industrial organization. The C.D. Howe Institute, in reviewing this research, concluded that directions for applied research might be identified better if they were based on a synthesis of the relevant literatures.

The Institute commissioned James A. Brander, University of British Columbia, to undertake such a synthesis. It then convened a two-day International Workshop on Trade and Industrial Policy in Toronto in September 1986 to discuss areas of agreement and disagreement among researchers and to identify the policy research agenda suggested by Brander's analysis.

This volume, which is intended to be a contribution to the international debate, contains the papers presented at the Workshop. The papers are aimed at an audience of economists, although most are quite accessible to the interested noneconomist.

In structuring the Workshop and commissioning the papers, the Institute's goal was to apply the trade and industrial policy literatures to scrutiny of governments' objectives, the instruments governments use to achieve those objectives, and some of the trade-offs they must make.

Brander's key survey paper, *Shaping Comparative Advantage: Trade Policy, Industrial Policy, and Economic Performance*, addresses some of the key issues governments face in the current international economic environment. Can or should governments try to shape trade patterns? This question has gained the attention of economists because of a conflict that is perceived to have developed between international trade theory and a more recent body of work that favors explicit industrial policies to influence trade patterns.

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*Murray Smith played a valuable role in project development. The manuscript was prepared for publication by Barry A. Norris; he was assisted by Cordelia Sharpe. As with all publications of this kind, the views expressed in the papers in this volume are those of the authors and do not necessarily reflect those of the Institute's staff or members.

To address this question, Brander synthesizes major works in the literatures and develops a policy research agenda based on this synthesis. His main finding, surprisingly, is that there are few major differences in substance between the trade policy and industrial policy literatures. Instead, Brander concludes, the differences lie more in style: how actively governments should pursue industrial policies and what instruments they should use.

The Institute invited three participants with backgrounds in the different areas of research and located in the United States, Canada, and the United Kingdom to critique and extend Brander's work. Their papers follow Brander's in the volume.

Paul Geroski, University of Southampton, brings European and industrial policy perspectives to his review of the issues. He expands the definition of industrial policy and suggests that, based on European experience, public procurement policies can play a valuable role in encouraging the development of new and profitable economic activity.

John Whalley, University of Western Ontario, comments from the trade theory perspective. He sees industrial policy prescriptions as an extension of the market-failure rationales for intervention that exist in trade theory and is skeptical that industrial successes commonly credited to industrial policy should be so attributed.

Laura Tyson, University of California at Berkeley, argues that government policies can and do affect competitive outcomes in international markets, that the United States' competitive position has eroded, and that a revolution is under way in production and communications technology that will affect trade patterns in profound ways.

The Workshop was structured so that the debate begun in these background papers could be joined by a group of experts drawn from both streams of economic inquiry and from both industrial and less-developed countries, as the list of participants at the end of the volume attests.

Several of the participants were requested to review the state of relevant research and practice in their countries. Many of their observations are summarized in the Workshop Report. A particularly provocative paper by David Richardson, University of Wisconsin, on the state of U.S. research and practice is included as the fifth in the volume. He employs the useful comparison between "strategic" and perfectly competitive environments and concisely summarizes U.S. strategic trade and industrial policy research and practice.

In the volume's sixth paper, the Institute's Senior Economic Advisor, Richard G. Lipsey, who chaired the Workshop, summarizes the main themes developed during the Workshop.

Lipsey's Report is more than a summary, however, in three ways. First, it steps back and reflects in an incisive way on some of the basic issues in the debate, particularly the important distinction between absolute and comparative advantage, which is often confused. Second, it introduces a further strand of research in the form of the address model as a line of theoretical inquiry that may help to resolve some of the differences between trade and industrial policy researchers. Third, it extends the research agenda that Workshop participants had time only to begin to develop.

The Report provides a comprehensive overview of the issues that developed in the Workshop debate. Lipsey organizes them so that the reader is first provided with a background on the strands of research and the conceptual issues and then is led, through the Workshop's insights, into the questions:

- why do governments adopt policies directed to shaping comparative advantage?
- how do they?; and
- should they?

During the Workshop, it became apparent that key areas of disagreement related to the theoretical and practical significance of phenomena associated with rapid technological change, the development of differentiated products, and spillover effects. The industrial policy school researchers saw many more grounds to justify policy intervention than did trade policy researchers. Lipsey continued to probe these issues after the conclusion of the Workshop and suggested theoretical approaches that may formalize some of the concerns expressed by members of the industrial policy school. His contribution is developed in his summary Report and in a short conceptual paper that is included as the final paper in this volume.

The Workshop discussion generated research questions about conceptual and applied issues. Discussion on the latter group tended to emphasize the value of case studies, based on a carefully thought-out conceptual framework, of experiences of national and subnational units.

The C.D. Howe Institute is publishing this volume in the hope that it will be a stepping stone to proposals for further research in a cross-national context, especially on policy. We would like to acknowledge the valuable contributions made by all Workshop participants, some of whom traveled long distances to contribute to the discussion. We also would like to express our appreciation to the Ford Foundation for a grant that made the Workshop and this publication possible.

Wendy Dobson
President
C.D. Howe Institute
December 1986

Shaping Comparative Advantage: Trade Policy, Industrial Policy, and Economic Performance[1]

James A. Brander

Introduction

Economic performance varies remarkably across countries. The most striking recent example of unusually strong performance has occurred in Japan. From 1960 through 1985, Japan sustained an annual per capita growth rate of real GNP of 6.1 percent, causing per capita GNP to more than triple during that period. In 1960, Japan had a per capita GNP about half that of the United Kingdom. It passed the U.K. level in 1982, and has significantly narrowed the gap on Canada and the United States.[2] More striking to the ordinary North American consumer is the fact that consumer markets seem inundated with Japanese goods, particularly in the area of consumer electronics.

The Japanese example has provided ammunition for those who advocate the use of industrial policy to shape economic development. The terms "industrial policy" and "industrial strategy" are the common focus of a group of critics of traditional economic policy in Canada and the United States. These critics do not see themselves as a unified school of thought. Taken together, however, they are beginning to attract considerable attention in political circles and in the business press, and may well exercise substantial influence over economic policymaking in the near future. The following quotations illustrate the basic problem as posed by U.S. industrial policy activists.

> For some fifteen years the United States has been losing its capacity to compete in the world economy....The principal competitive challenge comes...from a new group of competitors in East Asia: Japan, South Korea, Taiwan, Singapore, and Hong Kong...Unless the U.S. reexamines and modifies its basic economic strategy, it cannot expect to generate the performance necessary to finance its simul-

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[1] I would like to thank Donald J. Daly, Wendy Dobson, Richard Lipsey, Rachel McCulloch, and Murray Smith for very helpful comments.

[2] This information can be inferred from *World Development Report, 1984* (New York: Oxford University Press for the World Bank, 1984), which has data to 1982. More recent data is available from *International Financial Statistics* (International Monetary Fund).

> taneous commitments to leading the Western Alliance, increasing the domestic standard of living, and improving the distribution of income.[3]
>
> Industrial policies start from the observation that...American industry is being beaten up in international competition....Since the old ways have failed, try new ways. Replace the inefficient implicit industrial policies which the United States now has with more explicit, more efficient industrial policies that match those found abroad.[4]
>
> The pre-eminence of the United States in international industrial competition and the insulation of American markets from foreign competition have ended. In industrial sectors as diverse as autos, steel, consumer electronics, textiles and apparel, American firms now face intense competition. These sectors...have become vulnerable to developments abroad....The increasing pressures of international competition on domestic industry are the motivating factor behind contemporary interest in industrial policy and active trade policy in the U.S.[5]
>
> The recent progress achieved by Japan and several European countries, and America's relative decline, require no convoluted explanations....[t]hese countries are organized for economic adaptation...America is not.[6]

As these quotes clearly indicate, most U.S. industrial policy advocates start from concern about the alleged relative decline in U.S. economic performance and the declining competitiveness of U.S. firms in international markets. All are agreed that there has been a major failure of economic policy in the United States, Canada, the United Kingdom, and at least a few other countries.

Despite the major impact this work has had in popular forums, it has had very little within the community of academic economists. For the most part, academic economists, until very recently, have simply ignored the industrial policy debate.[7] When mainstream economists do examine the popular literature, they tend to be very critical. I suspect that most economists would agree with Paul Krugman's review of Scott and Lodge when he states:

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[3] Bruce Scott and George C. Lodge, eds., *U.S. Competitiveness in the World Economy* (Boston: Harvard Business School Press, 1985), pp. 1–2.

[4] Lester C. Thurow, *The Zero-Sum Solution* (New York: Simon and Schuster, 1985), pp. 267–268.

[5] Laura Tyson and John Zysman, "American Industry in International Competition," in John Zysman and Laura Tyson, eds., *American Industry in International Competition: Government Policies and Corporate Strategies* (Ithaca, N.Y.: Cornell University Press, 1983).

[6] Robert Reich, *The Next American Frontier* (New York: Times Books, 1983), p. 17.

> Sweeping conclusions are based on casual and often logically fallacious arguments, and evidence is used the way a drunk uses a lamppost — for support — not illumination.[8]

Krugman's critique of Scott and Lodge does not necessarily imply that the conclusions are wrong, only that the theoretical and empirical methodology is not up to the standards of mainstream economics. Furthermore, some of the industrial policy literature is more careful in its argumentation and warrants a careful examination. The Royal Commission on the Economic Union and Development Prospects for Canada (the Macdonald Commission) devoted a substantial effort to an evaluation of industrial policy, including reviews by Canadian economists, of which the studies by McFetridge and Harris are particularly good.[9]

The main objective of this paper is to examine critically the case made by activists of industrial policy, using the tools of mainstream economic analysis, and paying particular attention to issues of international trade and competitiveness. I also discuss empirical research methods in trade and industrial policy, and make some remarks about promising future methods and directions of research.

To begin, it is not entirely clear what the terms "industrial policy" and "industrial strategy" mean. Robert Reich, himself a major advocate of industrial policy, has observed that "industrial policy is one of those rare ideas that has moved quickly from obscurity to meaninglessness without any intervening period of coherence."[10] Reich's statement is clever but not very helpful, for it is certainly true that industrial policy does carry certain general connotations that warrant discussion, and that this discussion would be aided by precise language. Without devoting excessive attention to semantic issues, I would like to offer the following definition. Essentially, industrial policy should be thought of as "coordinated targeting", in the sense that it should involve some form of industry-, firm-, or project-specific policy (targeting), and that it should arise from some coordinated government plan to influence industrial structure in particular, well-defined ways (coordination).

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[7] See, however, R.D. Norton, "Industrial Policy and American Renewal," *Journal of Economic Literature* 24 (1986): 1–40, for a recent review article on industrial policy.

[8] Paul Krugman, "Review of Scott and Lodge (1985)," *Journal of Economic Literature* 24 (1986): 110–111.

[9] Donald G. McFetridge, "The Economics of Industrial Policy," in *Canadian Industrial Policy in Action*, Collected Research Studies of the Royal Commission on the Economic Union and Development Prospects for Canada, no. 4 (Toronto: University of Toronto Press, 1985); Richard Harris, *Trade, Industrial Policy and International Competition*, Collected Research Studies of the Royal Commission on the Economic Union and Development Prospects for Canada, no. 13 (Toronto: University of Toronto Press, 1985).

[10] Reich, *The Next American Frontier*, p. 32.

There is, of course, a well-established theory of economic policy that implicitly includes industrial policy. The theory begins with a statement of the objectives of economic policy, then considers how they might be achieved. Harris describes these objectives as:

- a high aggregate growth rate of average real income;
- stability in real incomes;
- stable and meaningful employment by all citizens; and
- redistribution of income consistent with social consensus about economic justice.[11]

The first objective can be associated loosely with trying to achieve economic efficiency. The second and third objectives are the subject matter of macroeconomics. The fourth derives from social value judgments and fundamental concerns about fairness.

The next step in the theory of economic policy is to ask how these objectives can best be achieved. The central insight of mainstream economics is that the objective of economic efficiency is promoted very effectively by private competitive markets operating under the principles of private property and voluntary exchange. The appropriate role of government policy, then, is to provide courts and police to protect private property, enforce contracts, and prevent involuntary exchange (theft, extortion, and so on).

Economists recognize, however, that private markets will not always produce efficient outcomes and, in such cases, will require some form of policy intervention. Private markets are not always competitive; governments, therefore, have some role in controlling or limiting the establishment and exploitation of monopoly power. In addition, the private sector will not provide public goods, such as national defense, because of the "free rider" problem. Since individuals who receive the benefits of such goods have no private incentives to support their provision, these goods have to be provided collectively. Governments also are called on to deal with externalities, which arise when private economic agents do not bear the full marginal cost of their activities, or, alternatively, when they do not get the full marginal benefit of their actions. For example, because firms that pollute do not bear the full cost of the pollution, they have an incentive to continue to pollute unless properly constrained by government policy. Finally, economists recognize information problems as causes of market failure.

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[11] Harris, *Trade, Industrial Policy and International Competition*.

Even simple pursuit of economic efficiency creates a substantial rationale for activist government intervention. The debate within the economics profession focuses on the empirical importance of monopoly power, public goods, externalities, and informational market failure, and on the ability of government institutions to deal with them. One fairly extreme school of thought, sometimes associated with the University of Chicago, holds that market failure is quantitatively insignificant, and that government institutions are themselves very inefficient. The policy conclusion of this school is that very little government intervention is called for. It should be emphasized, however, that many economists judge the empirical importance of these market failures to be very substantial.

The objectives of income stability and stable and meaningful employment, which comprise macroeconomics, also create a very strong rationale for government intervention in the economy. The basic interventionist strategy is generally associated with Keynes.[12] He was one of the first to popularize the idea that, contrary to apparent common sense, governments should run deficits in periods of high unemployment and surpluses in more prosperous times so as to stabilize aggregate employment and smooth fluctuations in real income. Unfortunately, Keynesian macroeconomics has proven not to be a panacea for stabilization policy, but most economists accept some form of modified Keynesianism as a basis for understanding and controlling economic fluctuations. The fourth objective, involving redistribution, or, more broadly, economic justice, also creates a major rationale for intervention.

Despite the well-established economic theory of government policy, there seems to be a growing sense that a new view of government intervention is called for in North America, and, in particular, that coordinated industrial policies should be considered. The standard economist's view, on the other hand, is that the practice of government policy in North America deserves to be criticized, but that the criticisms follow just as easily (and somewhat more cogently) from standard economic analysis as from any new theory of industrial policy.

One area in which the conventional economic policy literature has been remiss is in its failure to emphasize adequately international competition. Most of economics, including the major policy areas of public finance, industrial organization, and even macroeconomics, tends to ignore international issues. The typical assumption of most of the theory of policy arising from these areas of economics is that of the "closed economy", which allows international issues to be ignored explicitly.

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[12] John Maynard Keynes, *The General Theory of Employment, Interest, and Money* (London: Macmillan, 1936).

This traditional omission of international concerns from standard economic policy analysis — which is now being rectified — has left an open field to critics of policy who emphasize international competition. It is now clear, even in the United States, that the closed economy approach is no longer adequate for a practical understanding of economic events and policy. (In Canada and in most European countries, it has long been obvious that external factors must be considered explicitly in analyzing policy.) If mainstream economic policy analysis is to address concerns raised by advocates of industrial policy, it must embrace an international perspective.

The international economics literature itself has been slow to consider many of the important issues of policy concern. Until recently, international economics in the United States — and, therefore, in academic circles generally — was curiously innocent of developments in industrial organization. During the 1960s and 1970s, the literature of international trade theory was dominated almost completely by a particular class of models that, although very valuable for certain purposes, were also very limited. In the past five or six years, however, international economics has broadened its scope and now can address the issues raised by the industrial policy literature.

The international environment is important for (at least) the following reasons:

- International trade flows are a large part of economic activity in most countries. In Canada, for example, exports and imports are each in the neighborhood of 30 percent of GNP.[13] This means that a very high proportion of private-sector activity is export oriented, import competing, or closely linked to international markets for supplies of important inputs. My own estimate is that at least half of private-sector activity is in one of these three categories.
- Each country has sovereignty over its own policy, but domestic policy in one country can have a major impact on the economic performance of other countries. In the United States, for example, there is now serious concern that industrial policies in Europe and Japan are determining U.S. industrial structure by default.
- World financial markets are linked together. Interest rates and credit availability in any one country, therefore, are affected by financial markets in other countries. Since many nontraded goods, such as housing,

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[13] These data are available from many sources, including *International Financial Statistics*.

are affected by financial market conditions (especially interest rates), it follows that even nontraded sectors are vulnerable to international considerations.

- Nationalism: most people identify very strongly with their home countries. The series of quotes presented above illustrate that focusing on the overall competitive position of the United States in the world economy evokes a strong emotional response from many readers. The idea that different countries are in an international competition for economic supremacy seems to have appeal in most countries, sometimes leading to the dangerous misperception that international trade is a zero-sum game. Policies that seek to provide advantages to domestic firms or individuals in competition with foreign rivals are common, and policy retaliation for trading practices by foreign governments that are perceived as "unfair" are very popular.

For these reasons, any discussion of industrial policy must be closely linked to a corresponding discussion of international trade flows and international trade policy. The second section of this paper is devoted to a summary of the relevant areas of trade theory, emphasizing those aspects of recent research that bear significantly on industrial policy concerns. The third section presents my view of the modern economic foundation of international trade policy. The fourth section addresses industrial policy explicitly, focusing on the views presented by Thurow, Tyson and Zysman, Scott and Lodge, and Reich. The fifth section discusses empirical methodologies for assessing policy performance, including some suggestions about future lines of research, and the final section contains concluding remarks.

International Trade Theory

Standard Theory

The standard theory of international trade is based on the concept of "comparative advantage", as first described by David Ricardo.[14] The basic idea is simply that a country will tend to export those goods that it produces relatively efficiently. Canada may produce both wheat and textiles more efficiently in absolute terms than does Taiwan, but Canada exports wheat and imports textiles because its relative or comparative advantage is in wheat production. This is the Ricardian theory of comparative advantage.

The next step is to ask what determines comparative advantage. Rather obviously, the answer has something to do with factor endowments.

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[14] David Ricardo, *On the Principles of Political Economy and Taxation* (London: John Murray, 1817).

Taiwan has relatively little land suitable for wheat production; Canada has a great deal. More significantly, the ratio of useful land to labor is much higher in Canada than in Taiwan, and since wheat production uses a large amount of land, Canada can be expected to be able to produce wheat at lower opportunity cost than can Taiwan. These simple insights provide the foundation for the mainstream economic theory of international trade, which is usually referred to as "factor proportions theory".[15] The main idea, once again, is that trade patterns and industrial structure are determined by the relative abundance of the factors of production. Countries with a lot of labor will tend to produce and export goods that utilize large amounts of labor in production, while countries that are well endowed with capital will tend to produce and export capital-intensive products.

Analysis of the policy implications of international trade begins with an understanding of the "gains from trade". The Ricardian theory of comparative advantage has a very clear implication: trade generates gains by allowing specialization between countries. If Canada is comparatively better at producing wheat than textiles and Taiwan is better at producing textiles than wheat, then more of both commodities can be produced by having Canada specialize in wheat and Taiwan in textiles, and having the two countries trade with each other. Both countries will gain from trade. Furthermore, perfectly competitive markets will bring about exactly the right amount of trade. Free trade is the best policy from the world's point of view.

It is, perhaps, worth presenting a small example of Ricardian gains from trade. Ricardo himself used the example of Portugal and England. Suppose there is only one variable factor of production, labor, and suppose that, in England, it takes eight workers to produce one unit of cloth (per year) and four workers to produce one unit of wine. In Portugal, it takes 20 workers to produce one unit of cloth and five workers to produce one unit of wine. Note that England is assumed to be more efficient (in man hours) than Portugal in production of both commodities. In the absence of trade, both countries would produce both commodities. Trade allows a rearrangement of production. Suppose eight English workers are shifted from wine to cloth. English cloth production then rises by one unit, and wine production falls by two units.

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[15] Factor proportions theory is a generalization of the Heckscher-Ohlin model, associated with Swedish economists Eli Heckscher and Bertil Ohlin. Early formal development of the theory is due largely to Paul Samuelson and Ronald W. Jones. Good descriptions of the theory are available in most international trade textbooks. See, for example, Richard Caves and Ronald W. Jones, *World Trade and Payments*, 4th ed. (Boston: Little, Brown, 1985); and Wilfred Ethier, *Modern International Economics* (New York: Norton, 1983). For a sophisticated survey of modern trade theory, see Ronald W. Jones and Peter Kenan, eds., *Handbook of International Economics* (Amsterdam: North-Holland, 1984), vol. 1.

If ten Portuguese workers are shifted from cloth to wine, Portuguese wine production rises by two units, just offsetting the fall in English wine production, but cloth production falls by only half a unit. Taken together, the two countries have lost no wine and have gained half a unit of cloth. This is the gain that can be obtained from trade. English workers need not be protected from "cheap foreign labor", just as Portuguese workers need not fear "efficient English workers".

This example demonstrates that there are potential gains from trade in a Ricardian world. It is also true, but not explained here, that perfectly competitive markets will ensure that these gains are realized and that both countries benefit from trade. Factor proportions theory has the same basic policy implication as the simple Ricardian model. Perfectly competitive private markets undertake exactly the right amount of trade from an international point of view. The best policy is unrestricted free trade.

There are, however, several difficulties in trying to apply this simple policy conclusion in real situations. First, any policy change, including trade liberalization, will create winners and losers. Furthermore, the losers usually can identify themselves more easily than can the winners. Even though a policy of trade liberalization may generate far more gains than losses, the potential losers often will be a strong enough political force to block the policy. The economist's natural response is that the losers could and should be compensated, but compensation schemes rarely seem to work.

Second, even though free trade may be a good policy for the world as a whole, individual countries may be able to gain unilateral advantages from interventionist policies.

Third, the simple Ricardian and factor proportions theories leave out many important aspects of reality. In particular, these simple theories assume constant returns to scale and perfect competition, and assume away issues related to externalities, research and development, and market evolution. Adding such complications to the analysis raises the importance of international trade and industrial policies and, therefore, raises the stakes in "beggar-thy-neighbor" policy games.

Fourth, as an extension of the previous point, Ricardian comparative advantage is a "static" concept and makes no allowance for the fact that the structure of comparative advantage itself changes over time and can be influenced by policy. Bruce Scott attacks Ricardo directly:

> The challenge to traditional theory comes first and foremost from evidence that a number of countries have indeed succeeded in dramatically altering their comparative advantage....With the advantage of hindsight, it is obvious that the short-term and long-term

> growth and productivity prospects for cloth and wine were quite different in the original Ricardian example. For Portugal, the short-term advantage comes from specialization in wine; the long-term advantage comes from making a success in cloth, the "high-tech", high-growth, rapidly changing industry of the period....In short, the Portuguese should [have specialized] in textiles, not cloth, regardless of whether their costs [were] lower or higher than those prevailing in Britain at the time.[16]

Scott is certainly correct to point out that the traditional theory of international trade does not allow the issue of "creating" comparative advantage to be addressed. Only a very naive traditional trade theorist would say that standard theory implies that trying to "create comparative advantage" would never be worthwhile. The correct response, of course, is that basic trade theory has almost nothing to say about this policy question, because it takes factor endowments and technology as exogenously given, and because it assumes constant returns to scale. In the subsections that follow, some of the major recent developments of international trade theory are briefly discussed. These extensions do allow trade theory to address assertions about industrial policy.

Technology Transfer

Basic trade theory assumes that all countries have access to identical technologies, that factors of production are mobile between sectors within an industry, and that factors are immobile internationally. In standard trade theory, differences in comparative costs arise primarily from differences in factor endowments, not from differences in available technology. All of these assumptions appear to do major violence to reality. The assumption of identical technologies, for example, is inconsistent with the frequently made assertion that the composition of U.S. exports is explained largely by that country's technological leadership. This statement implies that the United States has access to different (and better) technologies than do other countries.

For most countries, improvements in technology come about mainly through technology transfer. What has been pioneered in one country is learned and adopted by other countries. The process whereby one country develops and exports a particular good, then loses market share to other countries that copy the innovation, then winds up as a net importer has been described as the "product cycle".[17] The basic hypothesis is that diffusion of new technology occurs slowly enough that temporary differences between countries in available technology are a significant determinant of trade patterns.

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[16] Bruce Scott, "National Strategies: Key to International Competition," in Scott and Lodge, eds., *U.S. Competitiveness in the World Economy*, pp. 75, 93–94.

[17] See Raymond Vernon, "International Trade and International Investment in the Product Cycle," *Quarterly Journal of Economics* 80 (1966): 19[illegible]-207.

Technology transfer has a number of interesting characteristics: it is often embodied either in physical capital or in educated labor, and it is closely associated with knowledge, which is a public good, and with research and development, which has well-known externality features associated with it. The importance of public goods and externality effects in technological development means that national governments might have a sound rationale to intervene in this process. In other words, if technology transfer is slow enough that the "technology gap" is an important determinant of trade flows, and if efficient technological development requires government support on the basis of sound market-failure reasons, then government policy certainly has a legitimate role in creating comparative advantage.

Increasing Returns to Scale and Imperfect Competition

Basic trade theory assumes constant returns to scale and perfect competition among firms. Increasing returns to scale (or economies of scale) means that there are net advantages associated with producing high levels of output. Technically, static increasing returns arise when an increase in inputs creates a more than proportionate increase in output. (This normally implies that average cost falls as output rises.) Dynamic increasing returns (or learning economies) arise when average cost falls as cumulative output rises. For static increasing returns, cumulative output does not matter — current average cost depends on the current scale of output. With dynamic increasing returns, history does matter — producing a lot this year will lead to lower costs next year due to the value of learning and experience.

The principal effect of allowing increasing returns to scale into the analysis is that the potential gains from trade are expanded enormously. The reasoning is fairly clear: larger market size, achieved through trade, makes possible lower average cost and more variety. Left to itself, a "small" country such as Canada might be unable to sustain a computer or jet aircraft industry. Certainly, countries such as Norway and Uruguay could not. Trade, even among a group of small countries, makes consumption and production of such goods economically feasible. While none of these small domestic markets could support the industry by itself, a single country can achieve efficient scale by producing for both domestic and export markets.

Allowing increasing returns to scale, however, does introduce complications. Although the gains from trade are expanded greatly, the distribution of those gains between countries is not so clear. Unlike the

Ricardian and factor proportions worlds, with increasing returns it is theoretically possible for one country actually to lose from trade, while the other country (or countries) gets all the gains from trade and then some. As first suggested by Graham,[18] the key to ensuring gains for one country is that those goods produced with increasing returns expand in that country. This is a strong sufficient condition for gains. There is also a policy implication: national governments might be able to improve national welfare by intervening to secure a large share of increasing returns industries in the domestic country.

Another ambiguity is that with increasing returns to scale, the possibility of "multiple equilibria" is much more likely. In other words, a given basic configuration of demands, endowments, and technology could give rise to different (possibly very different) outcomes. In general, the structure of trade patterns and the gains from trade are more sensitive to policy than in a pure Ricardian or factor proportions world. Particularly with dynamic increasing returns, current policy can have important permanent effects on trade because temporary learning advantages can lead to long-term comparative advantage.

Assumptions about returns to scale are closely related to assumptions about market structure. Perfect competition is inconsistent with the idea that individual firms knowingly operate in the region of increasing returns. A perfectly competitive firm, by definition, is one that takes the market price for its product as given. The firm itself cannot have any influence on the price of the product, just as a single wheat farmer has no impact on the market price of wheat. The competitive firm (or wheat farmer) simply charges the market price and brings to market all it (or he) wishes to sell at that price. If the firm faced a downward-sloping average-cost curve, it would have an incentive to expand output without limit as long as decreasing average cost persists.

The practical limit on such a process occurs when the firm becomes sufficiently large that it recognizes that it has some influence over the market price of its output. The firm is then no longer perfectly competitive. In industries characterized by significant product differentiation between firms, all firms may have some control over the market price of their output. In such a market, firms normally will be operating in a region of increasing returns to scale.

It is possible to incorporate increasing returns to scale into a theory of international trade without explicitly dealing with imperfect competition, but this requires that they do not occur at the level of the individual firm. The industry as a whole, however, is characterized by increasing returns. Such a situation can arise if each firm confers positive externalities on its rival firms, leading to a kind of "critical mass" phenomenon. This is called "external" increasing returns, and is important for policy as the main foundation for the so-called infant-industry argument for protection, which is discussed later.

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[18] Frank Graham, "Some Aspects of Protection Further Considered," *Quarterly Journal of Economics* 37 (1923): 199–237. See also Wilfred Ethier, "Decreasing Costs in International Trade and Frank Graham's Argument for Protection," *Econometrica* 50 (1982): 1243–1268; and Elhanan Helpman and Paul Krugman, *Market Structure and Foreign Trade* (Cambridge, Mass.: MIT Press, 1985).

If increasing returns are internal to the firm, then the firm must be imperfectly competitive. There are, however, many possible specifications of imperfect competition, reflecting the fact that there are many different market structures in the real world. Unfortunately, predictions about trade patterns and implications for policy vary markedly from one market structure to the other. Almost any policy can be defended on the basis of some theoretically possible market structure. Helpman and Krugman[19] offer the first good, systematic attempt to deal with the effect of market structure on trade patterns, although even this treatment is incomplete. They present three different market structures: contestable markets, Cournot oligopoly, and monopolistic competition.

One basic point about imperfect competition is that market structure itself becomes a determinant of trade patterns. Suppose, for example, that in the absence of trade, country A has a monopoly producing some good, while in country B there is something approaching perfect competition in the industry. Provided returns to scale are not too substantial, country A will have a higher price for this good than will country B. Once trade starts, exports will tend to flow from the low-cost source (country B) to country A. Thus, even in the absence of differences in factor endowments, differences in market structures between countries will give rise to trade flows. Even in this simple example, however, the final configuration of trade patterns is very sensitive to the assumptions about how firms interact.

The "contestable markets" approach borrows its terminology from Baumol, Panzar, and Willig,[20] although the basic idea of the model worked out by Helpman and Krugman is well known in trade theory. The underlying assumption is that an increasing returns industry is controlled, domestically, by a single monopoly firm. However, instead of pricing where marginal revenue equals marginal cost so as to maximize profits, this firm chooses to charge a price equal to average cost. This provides a comparatively simple model in which to analyze increasing returns to scale. Baumol, Panzar, and Willig suggest that firms might actually behave this way if markets are "contestable". This means that the incumbent monopoly firm believes that entrants will appear whenever it charges a price above average cost. Whether it is reasonable for incumbents to believe this has been the subject of considerable controversy.

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[19] Helpman and Krugman, *Market Structure and Foreign Trade.*

[20] William J. Baumol, John C. Panzar, and Robert D. Willig, *Contestable Markets and the Theory of Industry Structure* (New York: Harcourt Brace Jovanovich, 1982).

The contestable markets theory is of serious concern for the regulation of public utilities. In international markets, however, there are very few true monopolies, so the contestable markets model cannot be taken as descriptively accurate. Furthermore, the behavioral and policy conclusions of the model differ from other forms of imperfect competition. Although the model is pedagogically useful, I would not take it as a serious hypothesis for discussions of international market rivalries.

The other two market structures considered by Helpman and Krugman — Cournot oligopoly and monopolistic competition — both incorporate the idea that firms understand that they can increase sales by lowering prices, which I take to be minimal test of possible descriptive accuracy for most industries. Oligopoly and monopolistic competition are related market structures, and each has several variants. They incorporate a variety of characteristics that can be combined in different ways to create a whole family of models. Unfortunately, policy prescriptions are very sensitive to the exact specification of these characteristics, which include:

- homogenous or differentiated products;
- barriers to entry or free entry;
- price, quantity, or something else as the main strategy variable;
- unified or segmented markets.

The meaning of these characteristics may not be transparent at first glance. The first three are standard modeling issues faced in industrial organization. The model taken as "monopolistic competition", as first described by Chamberlin,[21] incorporates product variety among a large number of firms, with free entry driving profits in the industry to "normal levels" so that price equals average cost for each product. Firms are thought of as choosing prices as their choice variable, then supplying the quantities demanded at those prices. Industry equilibrium is taken to be a Nash equilibrium[22] in prices: each firm is choosing price to maximize its own profits, taking the prices of other firms as given. Because of product differentiation, each firm faces a downward-sloping demand curve for its variety: it recognizes that it can sell more by lowering the price; it is not perfectly competitive. The average-cost curves of firms are taken to be decreasing at low levels of production in accordance with the idea that there are fixed costs generating increasing returns to scale at low levels of output. A property of the model is that firms will operate in the decreasing portion of their average-cost curves, even if average cost is constant or increasing at higher levels of output; firms in this market structure operate under increasing returns to scale.

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[21] E. Chamberlin, *The Theory of Monopolistic Competition* (Cambridge, Mass.: Harvard University Press, 1933).

[22] Formally, a Nash equilibrium occurs when each player (or firm) in some strategic situation (or game) is maximizing its objective with respect to its strategy variable, taking as given the values of the strategy variables chosen by rivals. For good discussions of game theory and the Nash equilibrium concept, see R. Duncan Luce and Howard Raiffa, *Games and Decisions* (New York: Wiley, 1957); and James Friedman, *Oligopoly and the Theory of Games* (Amsterdam: North-Holland, 1977).

The main new element determining trade patterns arising from this market structure is that product variety itself becomes a reason for trade.[23] Consider two identical countries, each of which produces goods under conditions of monopolistic competition. In the absence of trade, there is some product variety in each country. If trade were allowed, each firm would perceive some demand for its variety in the other country and would have every incentive to export so as to move down its average-cost curve. The trading equilibrium would involve a large amount of intra-industry trade, with large quantities of slightly differentiated varieties of goods crossing each other at the border, as with French and West German automobiles, Swiss and Danish cheeses, or Japanese and U.S. consumer electronics goods. Gains from trade arise because international trade allows a greater variety of products to be produced than any one country could sustain in isolation. In addition, firms move down their average-cost curves, realizing economies of scale, which gives rise to lower prices and gains from this source as well.

An oligopoly model can be constructed taking alternative views of the first three characteristics. If one assumes homogenous products, barriers to entry limiting the number of firms at some fixed number (say, two), and that firms take quantities as their choice variables, then one has the basic structure of Cournot duopoly. The equilibrium is taken to be a Nash equilibrium in quantities: equilibrium occurs when each firm is maximizing its profit with respect to output, taking as given the output of its rival.

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[23] See Paul Krugman, "Increasing Returns, Monopolistic Competition, and International Trade," *Journal of International Economics* 9 (1979): 469–479; idem, "Scale Economies, Product Differentiation, and the Pattern of Trade," *American Economic Review* 70 (1980): 950–959; Elhanan Helpman, "International Trade in the Presence of Product Differentiation, Economics of Scale, and Monopolistic Competition: A Chamberlin-Heckscher-Ohlin Approach," *Journal of International Economics* 11 (1981): 305–340; Kelvin Lancaster, "Intra-Industry Trade under Perfect Monopolistic Competition," *Journal of International Economics* 10 (1980): 151–175; Anthony J. Venables, "Optimal Tariffs for Trade in Monopolistically Competitive Commodities," *Journal of International Economics* 12 (1982): 225–242; and idem, "Multiple Equilibria in the Theory of International Trade with Monopolistically Competitive Commodities," *Journal of International Economics* 16 (1984): 103–122.

The last characteristic, unified or segmented markets, refers to the idea that firms might perceive separate countries as separate markets. Segmented markets would arise if each firm made a distinct output (or price) decision for each country. Unified markets arise if a firm makes a single output (or price) decision, then throws its output on a "world market", allowing international arbitrage to take care of exporting and importing. Under perfect competition, segmented and unified markets are equivalent, but under monopolistic competition and Cournot duopoly, these two alternatives have important differences.

With Cournot duopoly and segmented markets, identical countries will trade even in the absence of product differentiation within the imperfectly competitive sector.[24] The basic idea is that, in the absence of trade, each country will have a price above marginal cost for the imperfectly competitive good. If trade is allowed, each firm sees the other country as a place where output can be sold profitably, despite the fact that foreign firms already may be in the foreign market. Trade will occur until markets in each country reach price-output levels commensurate with the larger number of firms now competing with each other. If there was one firm in each country before trade, there would be two firms in the world market once trade was allowed, and price and quantity would have to reflect this. In this structure, competitive pressure itself is a reason for trade. There is, of course, nothing fundamental about product homogeneity or about having a fixed number of firms in the oligopoly model. One can easily extend the results to include product variety and free entry or, for that matter, to the case of price rather than quantity as the choice variable for firms.

The range of possible market structures is much greater than that dealt with in the Helpman and Krugman model. Other major considerations in modeling market structure include choice variables aside from price and quantity, dynamic aspects, and multiproduct firms.

The real world contains many different market structures. There is no question, therefore, of whether any particular theory or model of market structure is the right one in general. The appropriate question is, Which theory is best suited for examining the industries under consideration? How to identify particular market structures when we see them is itself an important and difficult question. Traditionally, in applying competition policy, the principal measure or indicator of market structure is the extent to which total industry output is produced by a small number of firms. Specifically, four- and eight-firm concentration ratios, which measure the fraction of industry ouput accounted for by the largest four and eight firms, is taken to be a measurement of the extent of imperfect competition in the industry. As should be clear from the preceding discussion, however, this measure tells very little about the main things an analyst would want to know about a particular industry. Some hypotheses follow about industry characteristics that are important for understanding trade patterns and policy.

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[24] See James A. Brander, "Intra-Industry Trade in Identical Commodities," *Journal of International Economics* 11 (1981): 1–14; James A. Brander and Paul R. Krugman, "A 'Reciprocal Dumping' Theory of International Trade," *Journal of International Economics* 15 (1983): 313–322; and Anthony J. Venables, "Trade and Trade Policy with Imperfect Competition: The Case of Identical Products and Free Entry," *Journal of International Economics* 19 (1985): 1–20.

Hypothesis 1: The industry earns above-normal profits.
Hypothesis 2: Firms believe they have market power, in the sense that sales rise and fall as their own price goes down or up.
Hypothesis 3: Firms interact strategically with one another, in the sense that each firm recognizes (or believes) that its policies will trigger responses from rivals.

Trade Policy

Trade policy refers to policies that affect trade flows directly, such as tariffs and quotas on traded goods, export subsidies, and antidumping regulations.[25] Most trade policy involves so-called protection of domestic industry, which is protection for some at the expense of others. Historically, the main policy tool used to protect domestic industry is the import tariff. In recent years, however, tariffs have declined in absolute magnitude and in relative importance, and more attention has focused on nontariff barriers (NTBs), especially quotas or quantitative restrictions. Other NTBs include preferential purchasing arrangements — for example, when a government follows a policy of buying goods made locally — and administrative barriers (''red tape''). The next few subsections go over the major rationales for protection and other types of intervention.

The Monopoly Tariff

The basic implication of the Ricardian and Heckscher-Ohlin theories of international trade is that protection should not be used. The best tariff is none at all. The principal exception, within those theories, is the "optimum" or "monopoly" tariff. The basic idea is that a country can act just like a monopoly firm if it has monopoly power in its export market or monopsony power in its import market. In the case of monopoly power in export markets, such a policy would call for export restriction, just as a monopoly firm restricts output below competitive levels. Export tariffs would be called for. In practice, it seems that this theoretical motivation for tariff policy is rarely recognized or applied. Wilfred Ethier writes that there are no records of the monopoly tariff rationale being mentioned in U.S. congressional tariff debates.[26] Actual trade negotiators, however, are sensitive to the effects of tariffs on international prices or "terms of trade". One problem with the monopoly tariff is that it is particularly inviting to retaliation. Countries would be careful, therefore, about using such a tariff and even more careful about announcing the policy if they were.[27]

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[25] Traditional views of trade policy can be found in standard textbooks, and there are some good discussions of recent contributions to the theory of trade policy. See, for example, Gene Grossman and J. David Richardson, ''Issues and Options for U.S. Trade Policy in the 1980s: Some Research Perspectives,'' NBER Progress Report (Cambridge, Mass.: National Bureau of Economic Research, 1982); J. David Richardson, ''International Trade Policies in a World of Industrial Change,'' in *Industrial Change and Public Policy: A Symposium* (Kansas City: Federal Reserve Bank of Kansas City, 1983); Paul Krugman, ed., *Strategic Trade Policy and the New International Economics* (Cambridge, Mass.: MIT Press, 1986); and James A. Brander, ''Rationales for Strategic Trade and Industrial Policy,'' in Krugman, ed., *Strategic Trade Policy and the New International Economics.*

Raising Revenue

Once we admit any kind of role for government in an economy, it follows that the government requires revenue. Furthermore, although lump-sum nondistortionary taxes are common in the literature of economics, they are very rare in the real world. Government activities must be financed by distortionary taxes. The tariff is a tax; in the past, it was one of the least costly to impose, simply because of its low collection cost. Using the tariff simply to raise revenue, therefore, may be a very reasonable policy. This is still important in some less-developed countries. In industrial countries such as Canada, the revenue-raising aspects of the tariff are not very important — accounting for less than 5 percent of government revenue — but should not be neglected entirely. If one takes the view that government expenditures should be carried out to where the marginal benefits of those expenditures just equal the marginal costs of raising tax revenue (now or in the future), the implied tariff is probably low but above zero. Having noted that tariffs have the advantage of raising revenue, it should be recognized that many forms of protection use administrative resources, yet generate no revenue.

The Infant-Industry Argument for Protection

The revenue-raising motive for tariffs is probably as old as the institutions of government and international trade themselves. The infant-industry argument is somewhat less venerable, but still commands the respect of age. In Canada, for example, it was used during the early days following Confederation in 1867 to support high tariff barriers to U.S. competition, and it was used in the United States as well. Somewhat surprisingly, it also found strong support in nineteenth-century Britain.

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[26] Ethier, *Modern International Economics*, p. 193.

[27] For an examination of tariff retaliation in a Nash equilibrium framework, see Harry G. Johnson, "Optimum Tariffs and Retaliation," *Review of Economic Studies* 21 (1954): 142–153.

The argument runs as follows. In general, free trade is the best policy. A country may not be able to achieve its natural comparative advantage, however, if other countries are already well established in the relevant industries. For example, Canada might be a successful producer and exporter of high-technology computer hardware. Forced to compete, however, with U.S. giants such as IBM, Hewlett-Packard, and Apple, the Canadian industry might never have a chance to get going. A potential entrant must be prepared to suffer large losses while it trains its labor force, acquires a customer base, and so on. The infant-industry argument suggests, therefore, that such industries should be given tariff protection in their early years, or infancy, to allow them a competitive advantage in the domestic market until they are ready to compete internationally, at which point the tariffs will become unnecessary.

This argument is related to the presence of learning economies or dynamic economies of scale, and it certainly sounds persuasive. We all know that it takes time for a firm to become efficient and profitable. If we know it, bankers, investors, and entrepreneurs know it as well, and if computer hardware is a potentially profitable activity for Canadian firms, they should be prepared to accept short-term losses as an investment toward long-term gains, without needing government intervention. In other words, if the infant-industry tariff is a good policy in the sense that later benefits will fully compensate for the short-term costs of protection, then, in the absence of market failure, the firms themselves should be willing to take the necessary short-term losses. They would prefer, of course, to impose these costs on consumers and/or taxpayers, but if they are unwilling to bear these costs themselves, then the industry is not a good target for protection.

In order for the infant-industry argument to make sense, there must be some form of market failure. The two types of market failure that are most frequently used to support infant-industry arguments are capital-market imperfections and externalities.

The capital-market imperfection is that entrepreneurs simply cannot borrow the appropriate amount of money for long enough periods of time. For example, in most countries, long-term corporate bond markets simply do not exist. Even in Canada and the United States, which have highly developed financial markets, ten- and twenty-year corporate bond markets closed down during the inflationary period of the 1970s (but have since reopened).

The externality argument is usually based on labor force considerations. In a community of firms, no one firm is able to capture fully the benefits of training its workers, because those workers, once trained, frequently will move to other firms or even start their own firms. Each firm, therefore, confers positive externalities on other firms rather than being able to capture the benefits of its training expenditures. Each firm has an incentive to economize on training and to free ride on training provided by other firms. All firms face this incentive, which leads to retarded growth in the industry, and, in turn, to calls for government intervention. One possible policy is subsidization of the industry, but if the costs of raising government revenue are high, tariffs would be preferred.

One final point about the infant-industry argument should be emphasized. There are a lot of old infants around. Even a very perceptive government is going to pick a mix of winners and losers in selecting industries for such protection. What becomes of the losers? What started as an infant-industry argument for protection turns into an "employment-protection" argument at perpetual cost to the country as a whole. In short, the policy creates wards of the state, and wards of the state, once created, are costly to support and rarely disappear.

Profit Shifting

We turn now to the "new" case for protection. As indicated above, increasing returns to scale and imperfect competition greatly expand the potential gains from trade. They also make the determination of good policy much more difficult. There are several separate themes in this general area. The first is rent extraction,[28] and the argument runs as follows. If firms are imperfectly competitive — arising, normally, from increasing returns to scale — then firms may earn above-normal profits. If foreign-owned firms are earning such above-normal profits (or economic rents), it is possible to extract some of those rents using tariffs. Furthermore, such tariffs may serve to transfer rents to domestically owned firms.

An argument along these lines was made by a socialist government in the province of British Columbia in the early 1970s in connection with the auto insurance business. The argument was that foreign-owned insurance companies were making large profits that should be retained in British Columbia. The provincial government decided to exclude private firms from the industry altogether and to set up a Crown corporation to provide auto insurance. Subsequent events suggested that the auto insurance business was (and is) very competitive and, therefore, that there were no rents to extract. The principle of capturing profits or rents was not wrong, although the industry selected did not have the correct characteristics.[29]

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[28] References on rent extraction include Homi Katrack, "Multinational Monopolies and Commercial Policy," *Oxford Economic Papers* 29 (1977): 283–291; and Peter Svedberg, "Optimal Tariff Policy on Imports from Multinationals," *Economic Record* 55 (1979): 64–67. For a more general treatment of rent extraction and a description of profit shifting, I would recommend (with some bias) James A. Brander and Barbara J. Spencer, "Tariffs and the Extraction of Foreign Monopoly Rents under Potential Entry," *Canadian Journal of Economics* 14 (1981): 371–389.

Simple rent extraction involves imposing a tariff on a foreign rent-earning firm. Either an *ad valorem* (percentage) or specific (tax-per-unit) tariff will induce the foreign firm to reduce output and raise consumer prices. So consumers do lose, but for most demand and cost structures, the cost to consumers can be more than offset by the tariff revenue itself. Thus, rents are extracted from the foreign firm.

Profit shifting becomes a possibility if there is a domestic firm in the market as well, or if there is a potential domestic entrant. The outcome depends on the way in which firms interact, but for the most standard imperfectly competitive interactions, the tariff, naturally, will damage the relative position of the foreign firm and enhance the position of the domestic firm. The foreign firm's profits fall and those of the domestic firm rise. Thus, profits are shifted from the foreign to the domestic firm, expanding national command over goods and services — that is, increasing the domestic "pie" at the expense of foreigners.

In a related form of profit shifting, profits in world markets are the target.[30] For certain types of imperfect competition, it is possible to gain a net national advantage by subsidizing domestic firms so they have a competitive advantage in world markets. The subsidy is a transfer from domestic taxpayers to firms' shareholders. It provides no direct net advantage to the country as a whole, but it may have a strategic effect. It credibly commits the domestic firm to a more aggressive stance in world markets (by virtue of the firm's low, subsidized costs), and this may deter foreign rivals. If so, the domestic firm earns extra profits (shifted from its foreign rivals) in excess of the subsidy payment, yielding a net advantage to the domestic country.

It is possible that the wide-bodied jet aircraft industry, for example, conforms to this theory. Industry analysts suggest that the market probably can accommodate only two firms in the manufacture of the next generation of wide-bodied jets. Traditionally, this industry has been dominated by three major U.S. firms, but subsidies from a consortium of European countries, most notably France, have enabled a European entrant, Airbus, to gain a foothold in the current generation of jet aircraft.

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[29] For a description of the characteristics an industry should have in order for profit-shifting policies to apply, see Barbara J. Spencer, "What Should Trade Policy Target?" in Krugman, ed., ***Strategic Trade Policy and the New International Economics***, pp. 69–70.

[30] For a description of this form of profit shifting, see James A. Brander and Barbara J. Spencer, "Export Subsidies and International Market Share Rivalry," ***Journal of International Economics*** 18 (1985): 83–100; and James A. Brander, "Rationales for Strategic Trade and Industrial Policy," in Krugman, ed., ***Strategic Trade Policy and the New International Economics***, pp. 23–46.

The two firms that are able to dominate the next generation likely will make substantial profits, but it is unlikely that three firms could all make profits from the market. Boeing probably will be one of the "winners"; the other contenders are McDonnell Douglas, Lockheed, and Airbus. Subsidization of Airbus gives that firm an edge. If those subsidies persuade McDonnell Douglas and Lockheed not to compete in the next generation of aircraft (which appears probable) but to stay with their current products, then the subsidies will have had the effect described above. To the extent that a subsidy persuades rival firms to produce less or to stay out of the market altogether, it is possible that it can more than pay for itself in the form of profits or other rents.[31]

It does not follow, of course, that this particular subsidy policy is necessarily successful by economic criteria. If, for example, Airbus turned out to be an inefficient producer, then the subsidies might never be offset by earned profits. A large market share alone does not necessarily imply that the policy is a good one.[32] An extension of the profit-shifting policy idea is to view protection from imports as export promotion.[33] If there are simple economies of scale, then providing a home firm (or firms) with a protected home market will allow it to achieve a lower average cost and to compete on an advantageous basis with foreign firms in foreign markets. The same point applies if, instead of static returns to scale, the industry is characterized by "learning by doing", or "dynamic scale economies". In this case, the protected home market gives the domestic firm a chance to become proficient in production and to compete advantageously in foreign markets. (This is similar to the infant-industry argument.) In order for such a policy to be in the public interest, the industry must earn rents or above-normal profits. The net benefit to the country is equal to the extra gross profits earned by the firm minus the extra costs paid by consumers and taxpayers. In order for the policy to be attractive from a redistributive point of view, mechanisms must be in place that compensate losers without undoing the incentives that underlie the policy.

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[31] This kind of reasoning is based on the analysis of "precommitment" in oligopoly theory. See, in particular, Curtis Eaton and Richard G. Lipsey, "Capital Commitment and Entry Equilibrium," *Bell Journal of Economics* 10 (1981): 721–729; and Avinash K. Dixit, "The Role of Investment of Entry-Deterrence," *Economic Journal* 90 (1980): 95–106.

[32] For some theoretical limitations of the policy, see Jonathan Eaton and Gene Grossman, "Optimal Trade and Industrial Policy under Oligopoly," *Quarterly Journal of Economics* 101 (1986): 383–406. Other references on profit shifting include Avinash K. Dixit, "International Trade Policy for Oligopolistic Industries," *Economic Journal Conference Papers* 44 (1984): 1–16; and Avinash K. Dixit and A.S. Kyle, "The Use of Protection and Subsidies for Entry Promotion and Deterrence," *American Economic Review* 75 (1985): 139–152.

[33] See Paul Krugman, "Import Protection as Export Promotion," in Henry Kierzkowski, ed., *Monopolistic Competition and International Trade* (Oxford: Oxford University Press, 1984).

Retaliation and the Prisoner's Dilemma

Most of this discussion of trade policy implicitly assumes that one national government is taking action in an essentially passive world, a world in which one country's policy decisions will not influence the policy decisions of other countries. In practice, possible retaliation by other national governments for certain policy choices is a very important consideration.

We can imagine three sorts of policy outcomes. Consider the Krugman policy of protecting home markets. One outcome of this policy is that one country protects its home market and enables its home firm to gain an advantage in international markets — which translates into a national advantage for that country — while other countries do nothing. A second possible outcome is that all countries try to help domestically based firms through protection, with the result that no firm is able to do well in export markets. No firm is able to realize advantages of size and all countries end up with both low levels of competition and high costs. This is perhaps the worst of all possible worlds. The third outcome is that countries agree not to use protection. All countries do better than in the full-protection regime, but each must resist the temptation to try to gain unilateral advantages by being a lone defector.

A simple theoretical structure captures the incentive structure of this foreign policy environment. Suppose that there are two countries, A and B. Each has access to an interventionist policy that is in its national interest but that reduces the other's welfare. Cooperating means refraining from using the policy; defecting means adopting the policy. To illustrate the point, let us imagine that we can represent the net benefits to the countries of the different policy regimes using numbers. These benefits or payoffs can be summarized most easily by using a payoff matrix such as the following:

	Cooperate	Defect
Cooperate	4, 4	0, 5
Defect	5, 0	1, 1

The first element in each column represents the payoff to country A, the second represents the payoff to B. Along the top, country B's strategies are represented, and along the left, country A's strategies are listed.

Thus, if both countries defect from the cooperative, noninterventionist policy, each gets a return of 1. If country A defects and B does not, then A gets a return of 5, and B gets nothing from this industry. If neither country defects, each gets a net benefit of 4.

The actual numbers are not important. What is important are the relative magnitudes, which reflect a common situation in international policymaking. Unilateral predatory policy is attractive if the other country is passive, but mutual nonintervention gives the highest combined total return — in this case, 8.

Consider the problem country A faces if it has to make a once-and-for-all policy decision. If country B chooses a strategy of nonintervention, then A can make gains by intervening, because 5 is greater than 4. Furthermore, even if B chooses to intervene, A's best strategy is still to intervene because 1 is better than 0. Defection or intervention is a dominant strategy: no matter what the other country does, intervention is best. If governments only make decisions once, then the outcome in which both countries intervene is compelling as an equilibrium. Thus, each country gets 1, which is clearly much worse than the 4 each could get if only they could agree to open their markets to each other.

This particular strategic structure is known as the "prisoner's dilemma", since it is usually described using prisoners rather than countries. It is the most widely studied structure in the theory of strategic interaction, or game theory. The problem of choosing subsidy levels in the profit-shifting context has a structure similar to the prisoner's dilemma. It really does not matter whether the other country has a strategic subsidy or not; the best response for either country is also to use a subsidy. The actual benefit of the subsidy is much higher if the other country also does not use a subsidy, and both producing countries would be better off if neither used a subsidy, but the unilateral incentive to do so is clear.

One might ask why countries do not get together and do the sensible thing: to agree to avoid the use of subsidies altogether. International treaties usually are attempts to do precisely that sort of thing. The General Agreement on Tariffs and Trade (GATT), for example, is an attempt to get countries to agree multilaterally to have low tariffs. The problem with such agreements is that individual countries have incentives to cheat or defect. Cooperative outcomes are fragile at best because there is no international court that can force countries to abide by the treaties they sign. In the case of the GATT, success in getting tariff reductions has occurred simultaneously with major increases in other forms of trade intervention.

The prediction that noncooperative outcomes always occur, however, is clearly too pessimistic. A major problem with the theory of the prisoner's dilemma as presented so far is that it is restricted to the case of once-and-for-all strategy choices. In reality, a decision to use subsidies or to close home markets is not irrevocable and usually will be reviewed at regular intervals. In effect, the prisoner's dilemma game is repeated indefinitely. Repetitions of the decisions make the game much more complicated in that relatively complex strategies become possible. One strategy might be always to play the noncooperative move of defection. Another strategy might be always to play the cooperative move. More interesting are contingent strategies, such as the strategy of cooperating if the rival cooperated last time but defecting if the rival played the noncooperative move last time. This approach, combined with a first move of cooperation, is known as the "tit-for-tat" strategy. Much more complicated contingent strategies also are possible. A strategy to which economists have devoted considerable attention is the "trigger strategy", which is to cooperate until the rival defects and then play the noncooperative move forever thereafter.

What is the likely outcome of such an environment? One approach to answering this question is to try to draw inferences from observed strategic interaction among governments. While most analysts would agree that it makes sense to keep in mind what policymakers actually do, it is fairly obvious that this approach is limited by several factors. First, the world is not a laboratory in which experiments can be repeated. Consequently, the simple quantity of useful data is much smaller than one would want. Second, it is very hard to disentangle the many effects that contribute to real policy outcomes. Any particular policy action is normally the product of several factors. It is difficult, therefore, to isolate the effect any one factor, such as a particular strategic stance, has on the outcome. Yet, it is precisely the ability to isolate the consequences of different factors that constitutes real understanding.

A second possible approach is to confine oneself to purely theoretical investigations and to ask what rational decisionmakers would do in particular stylized situations. The obvious problem with this approach is that it relies too heavily on the analyst's idea of what constitutes rational or reasonable behavior.

A third style of analysis is to construct experiments. This approach suffers from the problem that one cannot be sure that people will behave in real situations as they do in manufactured environments, but I would argue that the results are at least worth looking at.

University of Michigan political scientist Robert Axelrod recently reported the results of some very interesting experiments.[34] Axelrod invited a group of game theorists from several different academic disciplines and countries to submit strategies for a repeated prisoner's dilemma game with a round robin format and a random stopping point. After a series of games, the scores were added up to determine the winner.

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[34] See Robert Axelrod, ***The Evolution of Cooperation*** (New York: Basic Books, 1984).

The winning strategy, submitted by psychologist and philosopher Anatol Rapaport of the University of Toronto, was tit for tat, which happened to be the simplest strategy submitted. (Recall that tit for tat cooperates as its first move, then does whatever the rival did last time.) This strategy required only four steps in a Fortran computer program. The second-place strategy (submitted by economists Nicholas Tideman and Paula Chieruzzi) was relatively complicated, requiring 41 Fortran statements. The trigger strategy, submitted by economist James Friedman, finished seventh in a field of 15 strategies consisting of the 14 entries and a purely random strategy included by Axelrod. The random strategy finished last.

Axelrod wrote up the results of this competition, including analysis of why certain strategies did well, then advertised in computer magazines for entrants in a larger-scale replay of the experiment. In the second experiment, there were 62 entries plus the random strategy. Whereas the first game had been restricted to professional game theorists from academic disciplines such as economics, psychology, and political science, the second game attracted most of its entries from computer buffs, although most of the original players again submitted entries. This time the entries were more complicated. The third-place finisher had 77 Fortran statements, and one strategy had 152 statements (and finished 43rd). A modified Friedman entrant fell to 52nd place. On the whole, the second game was much tougher, with second through sixth places being taken by fairly complex strategies. The winning strategy, however, again was Rapaport's tit for tat. Once again, tit for tat was the simplest strategy submitted, and was the only simple strategy to do well. Other strategies of comparable simplicity (six steps each) finished near the bottom. The random strategy finished 62nd (in second-to-last place).

What does all this have to do with policy? If experiments are any guide, strategies that call for cooperation if the rival cooperates and that quickly but briefly punish noncooperative behavior are remarkably successful. Tit-for-tat strategies are widely used in practical situations, of course, and they have a certain intuitive appeal. Unqualified cooperation is, in experiments, a poor strategy, but strategies that involve defecting first to get a temporary gain do not do well either when compared with tit for tat. To be successful, a strategy must have three characteristics. First, it must be able to acquiesce in long periods of cooperation with other relatively friendly strategies. Second, it must punish noncooperation. Third, it must be transparent, so that rivals understand that cooperation will be rewarded and defection punished.

This can be interpreted in a world of real policymaking. If a national government faces what it believes is a tit-for-tat strategy from another government, there is little it can do but cooperate, provided there is always a next period. Predatory strategies just do not pay against tit for tat, and cooperation, once established, is stable.

It is very tempting to apply the results of this experiment directly and advocate the use of tit-for-tat trade policies. Drawing inferences for policymaking from experiments like this, however, is not straightforward. One problem is that there are many policy areas, not just one, which means that it is hard to be clear about the correspondence between the policies of different countries. For example, it is sometimes argued that the United States should place import controls on Japanese exports in retaliation for Japanese protection from U.S. exports. The Japanese can reply, however, that certain of their protective policies are a response to U.S. firms' advantage in having preferential access to defense contracts, or in drawing on a heavily subsidized research establishment in the U.S. university system. In other words, in the real world, it is not easy to identify clearly which policy is "tit" and which is "tat". I do not believe that this problem of identification is insurmountable, but it does introduce extra considerations. If a country is trying to follow a tit-for-tat strategy, it has to select policy responses that are easily communicated as reasonable responses to a perceived predatory action by another country.

The general conclusions to be drawn from consideration of retaliation in policymaking are, first, that policymakers should at least consider likely retaliation when considering policy, and second, that there is something to be said for an explicit policy of limited retaliation to the policies of other countries.

The Political Economy of Trade Policy

There is a tendency to discuss policy as if national governments single-mindedly pursued some well-defined concept of the national interest. In fact, governments consist of politicians who are concerned about being re-elected and bureaucrats concerned mainly about their own incomes, prospects for promotion, and perhaps leading a quiet life. In addition, different people, including those in government, have different ideas about what constitutes the national interest. Canadian writers, actors, and musicians are likely to see great virtue in government support of the arts, while academics tend to favor increasing government expenditures on universities. The point is that government decisionmakers are subject to strong pressures from special interests. Even in Canada, which has a comparatively honest system of government, enormous resources are devoted to trying to influence government decisions.[35]

The study of this market for political influence is referred to as "political economy". I will not review the field of political economy here,[36] but a few points are highly relevant. First, trade is one of the policy areas most strongly influenced by special interests. Second, the interplay of special interests is unlikely to produce policies that serve the general public interest. In particular, the very practice of using up resources to influence government policy tends to be inherently wasteful. When the chief executive officers of Canadian companies start spending more time lobbying for government grants than worrying about the actual operations of their companies, taxpayers and consumers should get nervous.

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[35] For a description of business lobbying in Canada, see William Stanbury, *Business-Government Relations in Canada* (Toronto: Methuen, 1986).

In general, it is remarkable how rarely the economic analysis of tariffs seems to enter political debate over actual policy. As indicated earlier, the monopoly-tariff argument is never heard, revenue-based motives are minor, and profit-shifting arguments are, at best, a small part of the political scene. One does hear the infant-industry argument made frequently, but most of the public debate focuses on using tariff policy to protect employment, reduce trade deficits, influence exchange rates, or provide some notion of "fairness" to domestic firms or workers. Most economists reject all of these latter rationales as spurious, and would argue that the resulting tariffs are useless or actively harmful in pursuing the stated objective.

My view is that consideration of political economy weakens the case for any kind of active policy. A government body in charge of targeting firms for subsidy and tariff protection will be subject to lobbying and political pressures that rarely coincide with the public interest.

Industrial Policy

Definition

This section considers some industrial strategy proposals. As mentioned in the introduction, the Royal Commission on the Economic Union and Development Prospects for Canada (Macdonald Commission) contains several reviews of industrial policy. As these studies point out, industrial policy has no widely accepted definition. Adams and Bollino[37] offer the following taxonomy of industrial policy:

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[36] The basic reference on the economic costs of lobbying or "rent seeking" is Gordon Tullock, "The Welfare Costs of Tariffs, Monopolies and Theft," *Western Economic Journal* 5 (1967): 224–232. In the trade theory context, standard references are Anne O. Krueger, "The Political Economy of the Rent-Seeking Society," *American Economic Review* 64 (1974): 291–303; and Jagdish Bhagwati, "Directly Unproductive, Profit-Seeking (DUP) Activities," *Journal of Political Economy* (1982): 988–1002.

[37] F. Gerard Adams and C. Andrea Bollino, "Meaning of Industrial Policy," in F. Gerard Adams and Lawrence R. Kelin, eds., *Industrial Policies for Growth and Competitiveness* (Lexington, Mass.: D.C. Heath, 1982).

- general or nonselective industrial policies; these include policies available on equal terms to all industries in the economy;
- activity-specific policies; all industries are eligible for such policies but the policies are specific to particular activities, such as research and development;
- region-specific policies;
- sector-specific policies;
- industry-specific policies; and
- firm- or project-specific policies.

Some definitions are so broad as to make industrial policy include most areas of public policy. Breton, for example, suggests that "a definition of industrial strategy [can be] an attempt to reduce the gap assumed to exist between...actual output...and the socially optimal level."[38] The summary report of the Macdonald Commission defines industrial policy as follows: "Commissioners have chosen to define industrial policy in a broad sense to cover all government efforts to promote growth, productivity and the competitiveness of Canadian industries."[39] McFetridge offers a more restricted definition: "industrial policies are defined as those government policies which are intended to have a direct effect on a particular industry or firm."[40]

Some definitions of industrial policy emphasize policy procedures more than tools or objectives, the rationale being that government policymakers and business and labor leaders should deal with each other more directly and more cooperatively. Thurow writes:

> The goal is to set up a process in which government, labor, and management are encouraged to work together within a market framework to strengthen market outcomes. The state becomes not a central planner but a cooperative market player.[41]

As indicated in the introduction, my suggested definition is that industrial policy should be thought of as involving some form of industry-, firm-, or project-specific policy (targeting), and arising from a coordinated government plan to influence industrial structure in particular, well-defined ways (coordination).

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[38] Albert Breton, *A Conceptual Basis for an Industrial Strategy* (Ottawa: Economic Council of Canada, 1974), p. 3.

[39] Canada, Royal Commission on the Economic Union and Development Prospects for Canada, *Report*, vol. 2 (Ottawa: Supply and Services Canada, 1985), p. 133.

[40] McFetridge, "The Economics of Industrial Policy; p. 1.

[41] Thurow, *The Zero-Sum Solution*, p. 266.

The first characteristic, targeting, captures the familiar idea that selection of parts of the economy for special treatment is the foundation of industrial policy. The second characteristic, coordination, means that industrial policy carries with it the idea that some overall industrial strategy or plan is being pursued. The unconscious outcome of policies intended for other purposes is not usefully thought of as industrial policy. For example, slowing the growth of the money supply has much stronger effects on interest-rate-sensitive industries, such as residential construction, than on other industries. This policy satisfies condition one (targeting), but it is not an industrial policy because it does not satisfy condition two (coordination). On the other hand, the French policy of subsidizing the jet aircraft industry as part of a general policy of supporting high-technology industry is an industrial policy. Some advocates of industrial policy focus on targeting, while others focus on overall policy coordination and planning.

Most advocates of industrial policy, such as Reich,[42] argue that the United States (or Canada) already has an industrial policy consisting of the piecemeal combination of all existing policies that affect different parts of the economy asymmetrically. The next step is to argue that these piecemeal policies should be coordinated. I see this as sophistry. The basic point is that policies in place, for whatever reason, inevitably have different effects on different industries. Calling this industrial policy is to rob the term of any possible substantive meaning. The policy change being advocated, which involves particular, and possibly new, coordinated objectives and procedures, can usefully be referred to as industrial policy.

The following subsections examine the main arguments of several of the most influential advocates of industrial policy: Laura Tyson and John Zysman, who are associated with the Berkeley Roundtable on the International Economy, which is interdisciplinary in nature; Bruce Scott and George Lodge, the editors of the proceedings of a conference sponsored by the Business Policy group of the Harvard Business School; Robert Reich, of the Kennedy School of Government at Harvard; and Lester Thurow, an economist with the Massachusetts Institute of Technology and well-known commentator on public policy.[43]

I apologize to non-U.S. readers for the exclusively U.S. focus of these arguments. Most could be applied without modification to Canada, and presumably the principles discussed are intended to be general ones that would apply to all market-oriented democracies.

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[42] Reich, *The Next American Frontier.*

[43] The specific references are Laura Tyson and John Zysman, "American Industry in International Competition"; idem, "Conclusions: What to Do Now?" in Zysman and Tyson, eds., *American Industry in International Competition*; Scott and Lodge, eds., *U.S. Competitiveness in the World Economy*; Reich, *The Next American Frontier*; and Thurow, *The Zero-Sum Solution*.

The Problem

All of the commentators mentioned above see similar problems. Here is a list of the most central of these.

- U.S. economic performance has been poor since at least 1970.
- A major cause of poor economic performance is that the competitiveness of U.S. firms has been declining relative to major competitors, particularly Japan. (Reich puts the least emphasis on foreign competitors as a cause of U.S. problems; Scott and Lodge place the most emphasis on this point. All four commentators use Japanese performance as an important standard for comparison, supplemented with allusions to South Korea, Taiwan, and France as countries with successful industrial policies.)
- U.S. economic policy is largely to blame for poor economic performance. In many cases, existing policy is actively harmful, and at the very least, an opportunity to have a positive industrial policy has been missed.
- Adjustment in the United States is much too slow.
- U.S. savings rates are too low, leading to low rates of net investment and of productivity growth.
- In addition to being inefficient, current policy is also inequitable, requiring that certain groups share disproportionately in the costs of adjustment.
- Current policy attempts to deal with distributional issues tend to produce growth-retarding policies. Too much emphasis is placed on traditional and inefficient methods of short-term redistribution and consumer protection at the expense of long-term growth. New policies could improve both equity and economic growth.

Solutions

All of the advocates of industrial policy mentioned above are more specific and eloquent in discussing problems of current economic policy and performance than in discussing solutions. I found Reich and Scott and Lodge to be particularly vague and even inconsistent when discussing their proposed solutions. The following quotes contain samples of what I take to be summary statements from each of the four:

> The answer is not "national planning" if we take that term to mean the centralized drafting of detailed blueprints for future economic management....Instead we need political institutions that are as versatile as flexible-system enterprises...more devoted to responding to changing conditions and encouraging new enterprises than to stabilizing the environment for old enterprises. The instruments for implementing active adjustment will not be the blunt tools of historic

> preservation — broad-gauge tariffs, disparate corporate bailouts, and prayerful macroeconomics — but more supple tools like restructuring agreements, training and employment vouchers, regional development funds, and tax and financial codes that guide and accelerate market forces....Change and adaptability must be built into our public and private lives; rigid planning must be avoided.[44]

> The evidence and analysis in this book suggest, however, that we can solve our competitiveness problems effectively only by adopting a national strategy that is holistic, coherent, flexible, and balanced: holistic in embracing all the interrelated political, social, and economic causes of deterioration; coherent in pursuing various goals and policies; flexible in fitting particular remedies to the ailments they are designed to cure; and balanced in curtailing the postwar tilt toward short-term consumption in favor of longer-term gains. This implies three principal points for public policy. First we must understand that the U.S. has a strategy that has become progressively uncompetitive and favors short-term benefits at the expense of future prosperity. Second we must correct this imbalance both in macroeconomic policies and in those areas that affect industries generically, such as trade, antitrust, finance, technology, training, and employment. Only after these issues have been addressed should we undertake government programs aimed at particular sectors or firms. Third...we must perceive the full range of effects and share the burdens fairly.[45]

> Industrial policies are to a nation what strategic planning is to a firm. They outline the basic strategy the nation intends to follow in maximizing economic growth and meeting foreign competition. In both cases the aim is not a fixed unchanging strategy that firms within an economy or divisions within a firm must follow but an elastic strategy that evolves in response to changes in the environment....Industrial policies are both an expression of and a vehicle for bringing about a strategic consensus among government, industry and labor as to the basic directions in which the economy ought to be moving....Business might, for example, promise new investment and labor [might promise] changes in work rules if government were willing to help finance

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[44] Reich, *The Next American Frontier*, p. 263.

[45] George C. Lodge and William C. Crum, "The Pursuit of Happiness," in Scott and Lodge, eds., *U.S. Competitiveness in the World Economy*, pp. 491–492.

> additional research-and-development expenditures in a particular industry. Or government might promise a change in the tax code which would make it easier to finance new start-up ventures if labor and business would agree to restrain wage and price increases....In addition to general tripartite consultation and bargaining, most industrial policies involve the use of three operating arms. 1. A government agency is established to partially finance civilian cooperative medium-term industrial research on new products or new production processes. 2. Government systematically seeks to reduce the costs and increase the availability of capital to industrial firms. 3. The government has some systematic procedure for what is essentially "industrial triage". If a sick industry...comes to the government asking for protection...or any other form of aid, the industry — the firms, the unions, the industry's banks and its suppliers — are first required to go away and come up with an industry-development plan to remake the industry into a world class competitor....Industrial policies are...a form of cooperative coordination.[46]

> There are three broad economic justifications for an active industrial and trade policy: responding to foreign industrial policies toward critical national sectors; facilitating adjustment processes for both efficiency and equity reasons; and repairing market imperfections or offsetting market features that produce specific harmful effects in specific sectors. There are two political justifications for such policies: shaping existing policies to promote competitive adjustment; and developing policies to reduce political opposition to industrial adjustment by offering alternatives to outright subsidy or protection....If sector-specific policies are adopted in some instances — and we have argued that they should be seen as instruments of last resort — there are three basic premises that must be built into them. 1. Policies of protection should be self-liquidating. 2. Any sector-specific programs that provide specific gains to firms in the name of facilitating adjustment should be linked to obligations to spend those funds on adjustment activities. 3. Technical advisory boards or oversight boards for sector-specific policies should be drawn from a wide community.[47]

It is worth emphasizing that none of these four exponents of industrial policy regards industrial policies as the most important part of policy reform. All stress the need for good macroeconomic policy, for tax reform, and for improvements in a variety of policy areas. All see industrial policy, especially if narrowly defined as industrial targeting, to be of only secondary importance.

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[46] Thurow, *The Zero-Sum Solution*, pp. 263–265.
[47] Tyson and Zysman, "Conclusions," pp. 423–426.

All four are also circumspect in their discussions of policy tools and, in particular, claim to oppose the use of protective tariffs and quotas. There is qualified support for the use of subsidies to promote particular industries or particular activities. They place emphasis on the use of "flexible" industry-specific policies designed to meet the "needs" of particular industries and to allow them to become "world-class" competitors.

All of these authors emphasize the value of cooperative planning at the highest levels between business, government, and labor. The basic idea seems to be that current government policymaking is too hierarchical and too adversarial to work well. (Reich, in particular, makes a major point of the idea that the court system is being forced to make far too many policy decisions, and that the adversarial legal system is not a good way of reaching sensible policies.) All make the point that government (in cooperation with business and labor) should follow a procedure in national policymaking that is like strategic planning within the firm. Just as strategic planners in the firm decide what product lines should be pursued and how the different parts of the firm should be linked together, there should be corresponding strategy at the national level in deciding in which product lines the country should specialize and how different parts of the economy should interact. It is frequently argued that this function is performed by the Japanese Ministry of International Trade and Industry (MITI).

Analysis

One difference between mainstream economic theory and the industrial policy literature is that the former appears in specialized academic journals and makes extensive use of formal mathematical modeling, while the latter is written in popular form, is almost entirely descriptive, and certainly does not use formal modeling.

Formal modeling has at least two major disadvantages. First, it is inaccessible to nonspecialists; when doing research, economists usually communicate in a way that only other economists can fully understand. Second, formal modeling makes extensive use of simplifying assumptions that seem to distance the analysis from the complex real world. The advantage of formal modeling is that it requires careful definitions of terms and imposes logical consistency on the claims being made. If someone writes a paper claiming that subsidies might be in the national interest, the assumptions that lead to that conclusion must be specified explicitly.

The problem with popular descriptive material is that, while it can be logically rigorous, in general the standards of logical rigor are much lower than those used in mainstream economics. (I found Tyson and Zysman to be more carefully argued than the other pieces of work considered here.) Much of the industrial policy literature is logically flawed, making frequent use of false dichotomy, fallacies of composition, imprecise and even meaningless terminology, selective (biased) use of evidence, and outright inconsistency. Consider the following quote from Lodge and Crum:

> The alternatives for America are thus either to devise a national development strategy or to continue to resort to various ad hoc devices to protect its weakening industries from overseas competition.[48]

This is a clear example of a false dichotomy. The argument is presented as though there are only two alternatives when in fact there are other possible choices. For example, the United States could adopt a policy of *not* resorting to various *ad hoc* devices to protect weakening industries without having an explicit national development strategy. This is the basic noninterventionist position many economists favor. Thurow uses the same technique:

> When failure appears, there are three options: 1. Accept the failure and learn to live with it...2. Hope that something magical will come along to reverse America's failure or that foreign competitors will suddenly start to stumble....3. Since the old ways have failed, try new ways. Replace the inefficient implicit industrial policies which the United States now has with more explicit, more efficient industrial policies that match those found abroad.[49]

Like Lodge and Crum, Thurow presents a false choice. He invites the reader to believe that accepting failure, hoping for magic, or adopting an explicit industrial policy are the only options. Once again, an obvious unstated alternative would be to reduce total government intervention in the economy. In addition, Thurow makes a number of implicit assumptions that clearly are false. His second option suggests that international trade is a zero-sum game — that the United States will gain if Japan performs poorly. The whole point about trade is that both participants gain. Certainly, the United States has gained a great deal from Japan's economic development: Japanese technological developments have substantially improved the welfare of most U.S. consumers.

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[48] Lodge and Crum, "The Pursuit of Happiness," p. 495.
[49] Thurow, *The Zero-Sum Solution*, pp. 267–268.

As for imprecise language, all four groups of authors favor "flexible" policy, and Lodge and Crum also want policy to be "coherent" and "balanced". I suspect that few people would favor inflexible, incoherent, and unbalanced policies.

Selective and biased use of evidence is probably the most serious methodological problem in this work. Thurow states: "But there are other reasons for public investment banks. In 1981 Japan had 14,000 programmable robots while America had 4,000. How did the Japanese get such a head start?"[50] Thurow seems to take for granted that this is an example of the success of Japanese industrial policy. It may be, but simply arguing that the policy is successful because government aid produced more output in a particular industry does not prove anything. Government aid can always be used to expand production in an industry. What needs to be demonstrated is that government investment in robotics actually will produce more social value than the alternative investments that would have been undertaken in the absence of targeting of robotics. As Krugman demonstrates,[51] the Japanese record on targeting is mixed at best. Its targeting of steel and shipbuilding look like very questionable investments *ex post*. Japan has had high real growth, but it is far from clear that MITI has made a positive contribution.

I do not want to devote too much space to what seem like pedantic criticisms. It is important to point out, however, that professional economists are inclined to discount the popular industrial policy work simply because it does not meet the standards of precision and logical rigor that are normal in economic research. This is unfortunate because this literature does contain substantive ideas that should be addressed carefully.

Are the Problems Really Problems?

One substantive issue is whether the problems identified are, in fact, problems. There are a few obvious points to be made. First, the usual criterion of national success is per capita GNP, which is the best available measure of economic welfare. By this criterion, Japan has done very well in recent years, and no one can doubt that economic welfare in Japan is much higher than it was 25 years ago. Still, there are some reasons to believe that GNP comparisons overstate Japanese economic welfare. One problem involves accounting for externalities. A perfect measure of economic welfare would include subtractions for, say, environmental damage. This is a cost like any other and is reflected in many ways, including induced health problems, but it does not get properly accounted for in GNP.

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[50] Ibid., p. 278.

[51] Krugman, "Import Protection as Export Promotion."

Japan, with very high levels of congestion and comparatively weak environmental regulations, probably would require a larger negative adjustment for this factor than would Canada or the United States.

Voluntary leisure and household production also are important parts of economic welfare that are not accounted for in GNP. It is hard to measure leisure, but anecdotal evidence suggests that the Japanese work more than do Canadians or Americans. If so, then the economic welfare of Japan is overstated compared with that of Canada or the United States. In effect, the citizens of most western countries have chosen to take part of their increased wealth in the form of increased leisure.

Some factors tend to make GNP overstate U.S. economic welfare relative to Europe, Canada, and Japan. One such factor is high rates of violent crime, which should be accounted for by a subtraction equal to the value of welfare losses suffered and for extra resources devoted to avoiding crime.

Even if GNP is a sound measure of economic welfare, comparing growth rates can be misleading. The alleged problem is that the United States has had low savings rates and correspondingly low rates of real investment and productivity growth. It is certainly true that higher rates of savings and investment, other things being equal, lead to high growth rates. However, saving comes at a cost to a country, just as it does to an individual. That cost is lower current consumption. Saving more means consuming less today, presumably with the intention of consuming more tomorrow. If a country saves and invests more today, it will have more rapid economic growth and more to consume in the future. It does not follow, however, that higher rates of savings lead to higher total welfare, counting both present and future. Growth could be maximized by allowing only enough consumption for subsistence and by putting everything else into investment. Not many of us would want to live in such a society.

Currently, Americans choose to save relatively little and to spend most of their income on current consumption. This will leave less for the next generation than would be the case if savings and investment rates were higher, but this is a question of intergenerational equity, not simple economic efficiency. I suspect that the U.S. savings rate really is too low by some appropriate criterion, and that this is caused by distortionary policies that discourage saving. But it should also be recognized that Japanese savings rates are probably higher than the welfare-maximizing level, caused by distortionary policies that penalize consumption and encourage saving.

A major claim of industrial policy advocates is that poor U.S. economic performance (if it is poor) is caused by a loss of "competitiveness" relative to rival nations such as Japan, Taiwan, and France. However, a standard economic argument would hold that the United States has benefited greatly, in aggregate, from economic development in other parts of the world. In a static world with fixed resources, where economic growth merely means increasing one's claim over the world's fixed resources, one country's gain may come at another's expense. Japan's growth has not been like that; rather, it has come through accumulation of human and physical capital and through technological and managerial innovation. As Adam Smith would maintain, the principal effect of having such a competitor in the world marketplace is higher aggregate living standards for all. It is true that shareholders of firms in direct competition with successful Japanese firms lose, but provided markets are reasonably competitive, the benefits to consumers and to firms that use Japanese products as inputs should more than offset such losses.

My view is that economic performance in Canada and the United States has not been as good as it could have been (although not as bad as is often suggested), but that the main reason has to do with bad domestic policy, not Japan, France, or South Korea.

Overall, the problems on which the industrial policy advocates focus are exaggerated and the source of the problems somewhat misdiagnosed. The above qualifications notwithstanding, however, mainstream economists are some of the harshest critics of recent economic policy. U.S. performance *has* been disappointing. The United States has had low savings rates and productivity growth rates and, along with Canada and Western Europe, has gone through recent periods of high inflation and high unemployment; it is now trying to cope with unsustainable budget deficits.

Many economists would agree that economic policies should be improved. Attempts to provide equity and fairness, while well intentioned, have resulted in many policies that are damaging to economic growth without succeeding in their objectives. Worst among these are the industry-specific policies of protection designed to maintain employment in declining industries such as steel, textiles, and clothing. Canada is somewhat worse in this respect than is the United States, and both countries have a tax system that, as Thurow says, resembles Swiss cheese. There are so many loopholes and special provisions for special interests in the tax and transfer systems of these two countries that there is no longer a general sense that the tax system is fair, although the 1986 tax reform in the United States has made some progress toward restoring the integrity of the U.S. tax system.

Industrial Policy and Economics

The policy proposals that industrial policy activists make fall into two categories: those that follow directly from mainstream economics, and those that are unsupported by mainstream economics.

The first of these classes is the most important. Policies in this category include tax reform; more stable aggregate demand-management policies; improvement of the educational system; revision of the welfare system, probably along the lines of a guaranteed annual income; reduction of budget deficits; and, surprisingly, a commitment to an open trading system. In addition, various kinds of government intervention are called for by conventional market failure, as Tyson and Zysman recognize explicitly.[52] In particular, if there are positive externalities associated with high-technology research, then there is a sound economic basis for subsidizing these activities. Targeting robotics or computer research is perfectly consistent with economic analysis, provided these areas meet standard economic criteria.

Recent developments in international economic theory point out that in a world of dynamic and static increasing returns to scale, there may well be a unilateral incentive to use strategic subsidies and protection to try to stake out a claim in potentially profitable industries. These policies are not in the world's overall interest and if all countries follow them, all will suffer, especially if the protectionist route is adopted. The appropriate policy response is to continue working toward trade liberalization and restrictions on strategic intervention. The GATT has been successful so far in reducing tariffs, and this is probably the best route to go in dealing with other types of intervention as well, particularly subsidies.

In the second category — those that are not supported by economics — I would place the so-called adjustment policies. All four industrial policy advocates considered here make a point of the idea that policy should speed adjustment, with Reich being the most forceful. There is an appropriate pace for adjustment, which, in the absence of externalities or other major market failures, will be found by the market. It is true that many current policies actively slow the pace of economic adjustment, and these policies should be eliminated. According to standard economics, however, it would be an equal mistake to try to increase the speed of adjustment beyond its natural rate. This would impose unnecessary transition costs and reduce economic stability. For example, the best thing to do with antiquated steel mills is not to abandon them but to use them as long as their economic value is positive, then abandon them.

Another common point of emphasis in these industrial policy statements is the idea that policy could be better formulated by having cooperative planning embracing government, business, and labor. Part of the rationale seems to be political or social in nature, as commentators such as Thurow and Reich see such a system as more democratic than one in which government makes decisions without consulting business and labor. I see such a system as less democratic. After all, representative governments are elected by the entire electorate, including corporate managers and members of labor unions. Having extra input from organized labor and organized business lobbies seems to give certain subgroups in society double influence. There may be a rationale for having such extra input, but I do not see how it can be based on an appeal to fundamental democratic principles.

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[52] Tyson and Zysman, "Conclusions."

Overall, economics has very little to say about this proposal. It could be argued that business and labor lobbies provide information that is helpful in making decisions; perhaps the idea is that labor and business would be able to cooperate better with each other and strike more efficient bargains if they were also party to overall economic planning. It was argued that Japanese policy as conducted by MITI represents such a cooperative system. My impression (also based on anecdotes) is that MITI is much more hierarchical than North American government ministries and much less responsive to labor and business special interests.

Another idea is that industrial strategy represents the analogue of business strategy applied to an entire country, in that a government-level committee, possibly including business and labor, can make better decisions about product development and future market conditions than can private firms. This is not a feature of standard economics, and runs counter to the standard North American view of the relative competence of business and government decisionmakers. I would guess, however, that in Japan and France, it is taken for granted that government planners are more sophisticated and more competent than managers in private firms. In part, this reflects a different sociology. In Japan and France, the best students and most ambitious young people aspire to government service, just as many talented nineteenth-century Englishmen gravitated to the Foreign Office and the Colonial Office. In North America, the sociology is quite different, with many people looking on government jobs as inferior to private-sector employment. If this assessment is correct, then perhaps it is reasonable for Japan and France to have national industrial strategies while Canada and the United States do not. This is not the whole story, of course. One aspect of government decisionmaking that I find puzzling is that very talented and hard-working civil servants frequently are involved with very poor policies, which they could easily improve on if given a freer hand.

Tyson and Zysman make a major point of the idea that industrial policy would reduce the total amount of policy inefficiency associated with interest-group activity. They argue that, in the current situation, industries under pressure for any reason and especially those engaged in competition with a foreign rival are able to lobby for some kind of protection or subsidization. Such policies, they argue, are usually harmful and slow down necessary adjustment. The alternative is to have an explicit industrial policy with input from other industries as well, which would lead to better policies. Once again, this is not an economic argument and economics has little to say about it. The question is whether setting up a new government agency would increase or reduce total interest-group activity. If such an agency is merely added on to the existing structure of government, I suspect things would get worse, not better. If, on the other hand, this agency were actually to replace the huge variety of existing government agencies that are able to give piecemeal assistance to special interests, then perhaps Tyson and Zysman would be right.

As I see it, the difference between mainstream economics and industrial policy is more a matter of style than of substance. One of the problems is that the way in which industrial policy advocates structure their arguments would seem to lead to much more extreme policies than they in fact advocate. All of the industrial policy pieces considered here make a major point of the difficulties and successes of particular sectors. Usually, there is considerable discussion of some industry, such as semiconductors, where it is claimed that Japan has done very well through its policies of protection and subsidization. The implication is that the U.S. industry is operating at an unfair disadvantage. This plays into the hands of industry lobbies, which make exactly the same arguments when asking for protection.

The industrial policy advocates themselves, however, all claim to oppose protection and to regard subsidies as having very limited value. It seems that the emotional connotations of their arguments are very different, and much more interventionist, than the actual policy conclusions they draw. Consider the following passage:

> Foreign markets that have been closed or restricted must be opened to American producers. While protection must be resisted at home and abroad, and multilateralism promoted over bilateralism, the U.S. must realize that in the real world of international industrial competition, governments matter. Administered trade is almost the rule rather than the exception. Policies that ignore or deny these new realities risk serious injury to U.S. interests.[53]

While this statement ostensibly opposes protection, it cultivates a sense of injury in U.S. readers and leads to the presumption that the government should do something. In addition to negotiating down trade barriers in other countries, which the United States has been doing for the past 40 years in any case, what is that something supposed to be? When it comes to actual trade policy tools, there is not much to do except to protect or to subsidize, despite all the discussion about "flexible" or "holistic" policy. In short, it is the emotional content and unstated operational consequences of the industrial strategy statements, rather than their explicit policy recommendations, that are at variance with mainstream economics.

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[53] Stephen Cohen et al., "Competitiveness" (Berkeley, Cal.: Berkeley Roundtable on the International Economy, University of California, 1984), p. 38.

The Canadian Industrial Policy Debate

The industrial policy literature considered so far is American in origin and focuses specifically on U.S. problems. As mentioned previously, most of the concerns raised apply equally to Canada, although there are some differences — most notably, Canada has a higher savings rate than does the United States. There is, furthermore, a Canadian literature on industrial policy that is similar to, and somewhat older than, its U.S. counterpart. The best-known proponent of an activist targeting policy is the Science Council of Canada.[54] An economist's interpretation of its position would be that R&D-intensive activities have important positive spillovers and, therefore, should be subsidized. The Science Council's position also seems to reflect a basic distrust of the market system.

A second theme in the Canadian industrial policy literature is a strong economic nationalist sentiment, which seems to be founded on the view that U.S.-based multinationals operating in Canada will pursue policies that run counter to Canada's national interest. In particular, it is alleged that multinationals will make investment decisions that reinforce Canada's specialization in resources and branch plant manufacturing instead of contributing to a more diversified and more R&D-intensive industrial base. The economic basis of this argument is absent, and Canada's flirtation with nationalistic economic policies in the 1970s is not judged to have been successful.[55]

Evidence and Empirical Methodologies

Overview

One of the original objectives of this paper was to try to formulate alternative hypotheses to mainstream economics arising from the industrial policy literature. In looking through the industrial policy literature, however, I find very little that is both inconsistent with economics and sufficiently clearly formulated to be specified as an alternative hypothesis. While much of the argumentation in this literature is vaguely critical of what is taken to be standard economics, this is not the same thing as presenting alternative hypotheses. Tyson and Zysman, and Thurow, present policy positions that are very consistent with the standard theory of economic policy. The real issues are ones of estimation: How important are externalities in the robotics industry? Is there substantial market failure in capital markets? How important are increasing returns to scale in the mainframe computer industry? How will trade flows respond to tariff changes? It is precise answers to questions like these that will lead to specific policy recommendations.

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[54] See John Britton and James Gilmour, *The Weakest Link — A Technological Perspective on Canadian Industrial Underdevelopment* (Ottawa: Science Council of Canada, 1978).

[55] A critical view of these and other aspects of Canadian industrial policy can be found in D.J. Daly, "Weak Links in the 'Weakest Link'" *Canadian Public Policy* 5 (1979): 307–317.

Where industrial policy advocates say something different from economists is in the field of political and social decisionmaking where, in fact, economists have little to say. As indicated previously, industrial policy advocates argue that explicitly cooperative policymaking — including business and labor with government — will produce better policy. If the people who are involved in this cooperative process are simply smarter or better informed than normal private-sector decisionmakers, or if the resulting policy will be accepted more readily because it appears to result from social consensus, then perhaps cooperative policymaking will produce better policy. While economists have worked on theories of committee decisionmaking and public choice, and may yet contribute much more, I believe that such work is best viewed as tentative and preliminary and certainly not as part of the economics mainstream. This major area of emphasis in the industrial policy literature, therefore, does not represent alternative hypotheses to economic reasoning but is simply one view of a set of issues about which economists do not yet have much to say.

The ongoing effort to distinguish between alternative hypotheses and to estimate important parameters is a major part of economic research. Empirical methodologies divide into four general categories: hypothesis testing, model selection, and estimation; policy simulation; descriptive statistics and exploratory data analysis; and case studies. Most of the formal hypothesis testing in international trade has involved tests of the basic factor proportions proposition that trade flows are explained by relative factor endowments.[56] My overall interpretation of this work is that the basic factor proportions hypothesis has some explanatory power but it leaves much of what we observe unexplained. The main implication for policy is that those who argue that there is much more to the world than represented by the traditional factor proportions and Ricardian theories are certainly right.

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[56] For good reviews of this literature, see Alan V. Deardorff, "Testing Trade Theories and Predicting Trade Flows," in Jones and Kenan, eds., *Handbook of International Economics*; and Edward E. Leamer, *Sources of International Comparative Advantage: Theory and Evidence* (Cambridge, Mass.: MIT Press, 1985).

Trade Policy Models

Policy models do not test alternative models or alternative structur hypotheses. Instead, they assume a certain economic structure, then estimates the effects of policy changes, given the maintained assumption that the models themselves are an accurate reflection of reality. Three of the major policy models are described below.

The Michigan (or Deardorff-Stern) Model

As described in Deardorff and Stern,[57] this model is basically a collection of supply and demand equations. For any industry, net exports simply equal domestic supply minus domestic demand at the going price. The model assumes particular functional forms for preferences and costs, and supply and demand equations are derived from this. The supply-demand framework implicitly assumes perfect competition, and the production functions are assumed to have constant returns to scale. General perfect competition among internationally homogeneous goods simply does not fit the data well, so this model (and most others) makes the so-called Armington assumption: each country's output in a particular industry is assumed to be a different good from output in the same industry in other countries.

Demand and supply parameters (mainly elasticities) are taken from a variety of other sources. The authors do not actually calculate an "equilibrium" of their model. Instead, they restrict the analysis to changes. They take a base year, introduce some policy change (such as a tariff cut), then calculate the changes, from the base year, implied by the model. One experiment the authors considered is a 50 percent cut in tariff rates (from 1976 levels) by all industrialized countries. The predicted effect on Canada's GDP (Gross Domestic Product) is that it would rise by 0.07 percent (not 7 percent). Only Finland, among their sample of 18 countries, would experience an impact of more than 1 percent of GDP; its GDP would suffer a decline of 1.01 percent. Perhaps the most striking point about the predicted effects on welfare (and employment patterns) is the insignificance of trade policy.

The Whalley Model

The Whalley trade model is based on work by John Shoven and John Whalley on the "computable general equilibrium" methodology. In many respects, the Whalley model[58] is similar to the Deardorff-Stern model. It assumes a perfectly competitive, constant-returns-to-scale world, and imposes particular demand and supply curves arising from assumptions about functional forms for production and utility. It takes demand and production parameters from other sources and it also uses the Armington assumption.

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[57] Alan Deardorff and Robert Stern, "Economic Effects of the Tokyo Round," *Southern Economic Journal* 49 (1983): 605–624.

The main innovation of the Whalley approach is that it forces the model to be in equilibrium in the base year. In other words, base year data are collected, and an equilibrium is calculated for the model. Normally, this equilibrium will not be consistent. For example, the model's equilibrium may imply that Canadian wheat output was 100 million bushels when in fact it was 90 million bushels. Certain parameters of the model, in this case probably the supply elasticity for wheat, would be adjusted slightly and a new equilibrium would be calculated. This time, the predicted consumption of fertilizer might be off, and so on. Calibration would continue until the model generates the base year market data as an equilibrium. This process has the advantage of imposing minimal consistency requirements on the model. Policy changes are then fed into the model and a new equilibrium is calculated. The new equilibrium, therefore, includes predictions about the effect of policy.

Like the Deardorff-Stern model, the Whalley model predicts welfare and GDP changes arising from trade liberalization that are very small, normally less than 1 percent of GDP. Most of the welfare effects in the Whalley model (and in the Deardorff-Stern model) arise from the Armington assumption and associated optimal tariffs. As mentioned above, the Armington assumption posits that each country produces products that are differentiated from the products of other countries. For example, cars produced within Canada are all the same, but are differentiated from cars produced in Japan or the United States. Because of this differentiation, each country has market power with respect to most goods. As a result, the implied optimum or monopoly tariffs that would maximize national welfare are quite high for most countries. Each country gains when other countries lower their tariffs, but each loses when it reduces its own tariffs.

I find the importance of the Armington assumption for assessing welfare effects very disturbing. After all, the assumption is basically one of convenience. If anything, the necessity of making the Armington assumption suggests to me that there is a serious problem of model misspecification. I suspect that this assumption greatly overstates the degree of market power that particular countries have in their export industries and gives a misleading impression of the sources of gains from trade liberalization.

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[58] As described, for example, in John Whalley, *Trade Liberalization among Major World Trading Areas* (Cambridge, Mass.: MIT Press, 1985).

The Harris Model

The Harris model[59] is a computable general equilibrium model using the same basic methodology as Whalley. Its innovation is to include explicitly increasing returns to scale and imperfect competition. This makes the model much harder to solve, but that is basically a technical problem I will not go into here. Like the Whalley and Deardorff-Stern models, the Harris model assumes arbitrary functional forms throughout and takes parameter estimates from other sources. All three models involve simulation rather than estimation in the statistical sense.

In the Harris model, the principal effect of reductions in trade barriers can be subdivided into two parts. First, reductions in Canadian trade barriers force Canadian producers to lower prices and move down their average-cost curves, causing a partial rationalization of Canadian industry. Second, reductions in U.S. trade barriers allow Canadian producers to expand scale and to move further down their average-cost curves, which generates additional rationalization. Optimal tariff effects are very small. In total, the Harris model provides gains to Canada from complete trade liberalization with the United States of 8–10 percent of GDP. Since the United States accounts for about 75 percent of Canada's trade, this kind of change is roughly comparable to the policy exercise that Deardorff and Stern describe and it gives a welfare effect of between 10 and 100 times as great. Wonnacott and Wonnacott[60] did a rough calculation of the effect of free trade between Canada and the United States and came up with results slightly larger than, but of comparable magnitude to, those of Harris. Realization of returns to scale was the crucial element in the Wonnacott calculations.

There are several reasons to believe that the welfare effects in the Harris model are overstated.[61] It should be noted, however, that the Harris model implies fairly large resource shifts in the Canadian economy but does not consider transition costs.

The main point I would make here is simply that different assumptions about market structure and technology imply policy conclusions that differ by orders of magnitude. All three of the models described here are very fine pieces of work from the academic point of view. At least one of them, however, is highly misleading from the policy point of view. It is clearly much more important to get the basic assumptions right than to have a sophisticated and carefully constructed model. A "back-of-the-envelope" calculation that makes the right assumption about returns to scale may be more useful for policy than a very sophisticated model that makes the wrong assumption on this point.

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[59] As described, for example, in Richard G. Harris, with David Cox, *Trade, Industrial Policy and Canadian Manufacturing* (Toronto: Ontario Economic Council, 1984); or in Richard G. Harris, "Applied General Equilibrium Analysis of Small Open Economies with Scale Economies and Imperfect Competition," *American Economic Review* 74 (1984): 1016–1032.

[60] Ronald J. Wonnacott and Paul Wonnacott, *Free Trade between the United States and Canada: The Potential Economic Effects* (Cambridge, Mass.: Harvard University Press, 1967).

[61] For a critical review, see John Whalley, "'Trade, Industrial Policy and Canadian Manufacturing,' by Richard G. Harris, with David Cox: A Review Article," *Canadian Journal of Economics* 17 (1984): 386–398.

Another major policy model that has been used to assess the consequences of industrial policy is Project Link.[62] Dixit[63] has carried out a methodologically simpler exercise that, nevertheless, has some similarity to the large-scale policy models just described. Dixit assumes a particular structure for imperfectly competitive rivalry between North American and Japanese automobile firms: the generalized Cournot or conjectural variation model. He then estimates (or, more accurately, calculates) implied parameters reflecting industry behavior (rejecting pure Cournot or pure Bertrand behavior). From this and other information, it is possible to calculate rent-shifting tariffs and determine what impact they would have on economic welfare. Baldwin and Krugman[64] carry out a similar exercise for the computer chip industry, where dynamic economies of scale are important. I find this kind of work very promising.

Other Methodologies: Descriptive Statistics and Case Studies

Policy models usually do not contain internal statistical tests or true estimation and probably are best regarded as plausible simulations, contingent on the basic assumptions being accurate. These are not, however, the only ways in which data are used. Two other empirical methodologies are descriptive statistics and exploratory data analysis; and case studies.

Descriptive statistics basically involve constructing summary statistics that can be used to describe bodies of data. Such statistics, while they can often be used to help in choosing between alternative hypotheses, typically are used as a motivation for theory construction. Grubel and Lloyd,[65] for example, presented a large amount of data concerning intra-industry trade. They were able to document the extent and growth of intra-industry trade relative to total trade and to GNP. This work was really descriptive statistics and provided a challenge to theorists to build theories capable of explaining such observations.

Attempts at formal hypothesis tests are often carried out even when the conditions necessary for correct application of the tests do not hold.

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[62] Some of this work is described in F. Gerard Adams, ed., ***Industrial Policies for Growth and Competitiveness, Vol. 2: Empirical Studies*** (Lexington, Mass.: D.C. Heath, 1985).

[63] Avinash K. Dixit, "Optimal Trade and Industrial Policies for the U.S. Automobile Industry" (Princeton University, 1985, Mimeographed).

[64] Richard Baldwin and Paul Krugman, "Market Access and International Competition: A Simulation Study of 16K Random Access Memories," NBER Working Paper no. 1936 (Cambridge, Mass.: National Bureau of Economic Research, 1986).

[65] H.G. Grubel and P.J. Lloyd, ***Intra-Industry Trade*** (London: Macmillan, 1975).

The test statistics generated should then be viewed as descriptive rather than as supporting formal tests. It is not uncommon, for example, to collect some data series on several variables, such as net exports, exchange rates, factor endowments, factor prices, GNP, unemployment, profits, concentration, tariffs, and so on, then run OLS regressions on many permutations. Such a procedure is likely to turn up at least a few apparently significant relationships. However, the t-statistics that are used to test the significance of explanatory variables cannot be used (at least directly) in such a case. Rather obviously, if one takes enough random, unrelated data series, then runs all possible permutations as regressions, some variables will appear simply by chance as significant in explaining others, even if no true relationship exists. Therefore, as one tries more and more possible regression specifications among a group of variables, the level of apparent significance that would be necessary to warrant statistical confidence rises. Unfortunately, it is very difficult to determine the precise statistical properties of this process. In the absence of a formal understanding, the test statistics of the various regressions should be regarded as descriptive statistics or, at best, as exploratory data analysis.

The value of descriptive statistics is that it does actually describe data and provides stylized facts that can serve as a foundation for theory construction. Exploratory data analysis, which is the next step up in statistical sophistication, is very useful in identifying promising areas for future empirical research. Suppose, for example, that "data mining", as just described, were performed on Canadian data and that some apparent relationship turned up between net exports and percentage of foreign ownership for a log-linear regression. Such a relationship might occur just by chance in the data, but it suggests that this relationship might be investigated for other countries. If the relationship does capture something general and real, then it should show up in other bodies of data and can be tested formally.

The art in doing descriptive statistics is in deciding what data to collect and how to present them. The methods of descriptive statistics and exploratory data analysis are probably very much underused in economic analysis, as economists are more inclined to attempt formal estimation and hypothesis testing even when the conditions for using formal methods are not properly met.[66]

The case-study method is the least formal of empirical methodologies. If one were trying to determine the impact of a particular policy on trade performance, for example, the case-study method would involve a detailed study of one case where the policy had been applied in practice. It is often suggested that there is a close relationship between high-technology exports and high-quality local universities on the basis of two cases: northern California (Stanford and Berkeley) and eastern Massachusetts (MIT and Harvard). A case-study methodology would involve a close investigation of the relationship in these two cases. In a formal sense, this generates only two data points, which could not be used to infer anything. The problem with formal analysis is that it excludes a lot of information. For example, it is hard to fit into formal analysis the fact that the Dean of Stanford's Engineering Faculty during the early development of Silicon Valley had very close links with fledgling high-tech firms, many of them run by former students. A case study can make use of all available information, even if one does not know how to fit the information into a regression equation.

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[66] A good general reference on exploratory data analysis is John Tukey, *Exploratory Data Analysis* (Reading, Mass.: Addison-Wesley, 1977).

The danger of the case-study approach is that it imposes much less discipline on the investigator than does formal applied statistics or even descriptive statistics. A biased investigator — and all investigators are biased in some way — will see, in part, what he or she wants to see. An investigator who believes or who wants to believe that universities play an important role in local economic development will interpret the Silicon Valley and Route 125 (Massachusetts) cases in a particular way. An investigator who believes, alternatively, that high-tech economic development is linked to vigorous, highly liquid venture capital markets, or to proximity to very pleasant major cities where people like to live, or to integration with efficient land, sea, and air transportation networks could make favorable interpretations of these two cases. All factors might play some role, or the principal explanation could be something quite different.

What kind of methodology offers the best prospects for shedding light on important industrial and trade policy issues? The easy answer is, All of them; all are complementary and none should be ignored. Unfortunately, such a response does not help government agencies, private research organizations, or universities to decide where to allocate scarce resources. A more useful paraphrase of the question is: Given the existing state of research, what is likely to be the highest-yield method or portfolio of methods for a research organization such as the C.D. Howe Institute?

Research Proposals

There are several considerations that bear on recommendations about research methodology. The first concerns the skills and abilities of potential researchers. If the idea is to draw on university faculty for research, it should be noted that different types of research will attract different people. There is, generally speaking, a higher academic payoff to more formal and more sophisticated methods, especially in the economics profession, even if the type and quantity of data do not allow much confidence to be placed in the results. It follows, therefore, that it is easier to attract ambitious young scholars to more formal lines of research. The other problem, which in my view is less serious, is that the investigators might not be sufficiently skilled in formal techniques to do a good job of analysis.

The second issue concerns new evidence. Additional formal analysis is most desirable if major new bodies of data or new methods that can do a better job of analyzing existing evidence are becoming available. Expressed slightly differently, in deciding where to devote research resources, attention should be paid to the exogenous flow of information. A major policy experiment, such as that under way in China, offers great potential for research of a particular sort. Advances in computer technology have made formal estimation and hypothesis testing much easier and cheaper than they once were.

In addition to the continuing work on policy model simulation and standard hypothesis testing, I would make the following comments about future empirical work.

First, I believe that the most important area of research is estimation of crucial parameters associated with industrial organization, particularly the extent of economies of scale, and also behavioral parameters that reflect how rival firms interact.[67]

Second, I think insufficient attention is paid to the role of background environment in influencing economic performance. This suggests close investigation of particular countries or subnational regions using the case-study method to describe the background policy mix that underlies particular outcomes. The problem is to carry out such investigations with a level of rigor and objectivity at least approaching that of formal econometrics. There is, after all, no shortage of special studies of Japan, Silicon Valley, or the European Economic Community experience, but mainstream economists do not take seriously most existing work of this sort.

Third, the Dixit or Baldwin and Krugman type of industry-specific policy simulation strikes me as very useful. This reflects my view that the industrial structure of the modern world is very heterogeneous, and that policy models which impose a single market structure on the entire economy are excessively optimistic. This approach ideally would include some kind of test of market structure for the industry in question, and would draw out the implications of this test for policy.

Fourth, in recent years, formal econometrics has made major advances in the area of model selection — that is, choosing between models. In particular, attention has been paid to choosing between functional forms. Since many policy conclusions rest on forms of demand and cost functions, I believe there is considerable scope for useful applications of these formal methods.

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[67] An example of such work is D.J. Daly and D.C. McCharles, *Canadian Manufactured Exports* (Montreal: Institute for Research on Public Policy, 1986), which reports recent estimates of economies of scale for a variety of industries.

Fifth, with regard to descriptive statistics and exploratory data analysis, Grubel's intra-industry trade data took a lot of people by surprise. Who knows what other surprises are out there in the data. Economics is interesting in its ability to be schizophrenic toward methodology. Friedman's interpretation of Popper's methodology has been taught in graduate schools for the past 30 years as the methodology of economics.[68] This methodology involves formulating theories, then making predictions, and finally testing to see whether or not these predictions are rejected by the data. In practice, however, one usually starts with some idea of facts or phenomena that one would like to explain, then tries to devise a theory that fits. There is, of course, considerable debate among philosophers about appropriate methodology, and Popper's approach is only one view.[69] My proposal is simply that descriptive statistics can contribute to shedding light on questions related to trade flows and industrial policy.

Concluding Remarks

The starting point for this paper was the question: Can or should governments try to shape trade patterns? This question has gained attention because of the apparent conflict between traditional economic theory, particularly international trade theory, and a new body of work favoring active and explicit industrial policy. One might expect traditional economists to answer the question with a resounding No, while industrial policy activists would answer in the affirmative.

I have found, however, less difference in substance between industrial policy advocates and mainstream economists than might have been expected. To start with, it is obvious that government policy can influence comparative advantage. A large enough government investment in any industry will make it possible for a country to become a net exporter of the good in question. Similarly, government policies toward exhaustible and renewable natural resources will determine whether those resources will form a basis for comparative advantage in the future.

The real question concerns how actively should governments engage in such policies and what policy tools they should use. This question cannot be answered simply but requires a long, detailed set of policy recommendations. Mainstream international trade theory has become more sophisticated recently. It is capable of verifying rigorously the claim of industrial policy advocates that, under conditions of dynamic and static increasing returns to scale and imperfect competition, it is possible for one country to gain an advantage by well-constructed targeting policies involving protection and subsidization. However, the basic prescription of trade economists remains: the best policy for the world as a whole is a liberalized regime of free trade. Surprisingly, perhaps, the industrial policy advocates reviewed here all claim to oppose protection and to support an open trading system.

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[68] Milton Friedman, *Essays in Positive Economics* (Chicago: University of Chicago Press, 1953).

[69] For a very interesting critique of Friedman's interpretation of Popper, see Alan Coddington, "Positive Economics," *Canadian Journal of Economics* (1972): 1–15.

Furthermore, the industrial policy work reviewed here seems to agree with economists' standard view that selective, industry-specific policies should be at most a minor part of the policy environment. Thurow, for example, focuses first on tax policy and its effects on incentives to save and invest, education policy, and macroeconomic stabilization. Mainstream economists would generally agree that these are the important areas of policy concern in the United States.

The industrial policy advocates do suggest an approach to policymaking that is not part of standard economic theory. All four views presented here advocate, with varying degrees of emphasis, some kind of government agency or committee that would carry out some economy-wide strategic planning, picking areas for subsidization or other special policies, dealing with problem industries as they come up, and drawing on business and labor as well as government to contribute to the decisionmaking process. Economists might point out the advantages of decentralized decisionmaking and the poor performance of economic planning in socialist countries. The industrial policy advocates all seem defensive on this point. After (or before) advocating such industrial strategy activities, they say that they do not mean "rigid planning", but want a "flexible" approach, whatever that means. There do seem to be some real differences here, but the industrial policy advocates are not sufficiently clear about what they have in mind for the reader to infer specific underlying hypotheses about economic behavior.

The other difference between mainstream economics and the industrial policy literature is one of style. The research literature of economics appears mainly in professional journals and makes some pretense to scientific objectivity and analytical rigor. The industrial policy literature, on the other hand, is targeted at a much broader audience and relies almost entirely on description, anecdote, and metaphor. The more informal approach is conducive to vagueness, overstatement, and inconsistency. The net effect is that the two literatures seem more different than they are.

There is, of course, plenty of disagreement within the economics profession over policy reform. All economists accept the assertion that externalities, if they are significant enough, call for government intervention. They differ, however, in their assessment of the empirical significance of these externalities. Similarly, all economists realize that monopoly power can cause unregulated markets to depart from appropriate standards of performance. But they differ, once again, over the empirical significance of this problem. The industrial policy advocates are similar in many respects to those economists who see a strong case for government intervention. Furthermore, despite the focus of industrial policy on industry-specific targeting, the industrial policy advocates seem to agree with many economists about the importance of economic "framework" or "background" policies.

Consider the Japanese example once again. There are many theories about Japanese economic performance. Japan has had a policy of industrial targeting and selective protection that some observers argue might have been important. Other observers look at Japan and argue that it is macro policies that have been most important to Japanese performance. In particular, Japan's tax and transfer system encourages saving much more than do U.S. policies. Japan has a very high savings rate and, consequently, has a very high rate of net investment. This can hardly help but contribute to rapid economic growth. In addition, by keeping consistent pressure on its exchange rate, so it is usually a little low, Japan gets continuing aggregate demand stimulus without the necessity of running up a large deficit.

Someone who has studied labor relations and labor economics might focus on Japanese labor relations as the key element of that country's performance. The Japanese system of bonuses is very much like profit sharing and gives workers much more interest in the overall performance of their company. Financial economists might look to Japanese financial structure, which gives major debtholders, such as banks, a much more important role in managing companies than is true in North America. A sociologist, no doubt, would have several different sociological explanations.

The problem is not in explaining Japanese performance, but that there are too many explanations. Any discussion of policy should consider the possibility that it is the general economic and social background, created in part by exogenous history and in part by a whole mix of different policies, that is the most important determinant of economic performance.

A very important part of background is the general incentive structure of the economy. Specifically, a society should create an environment in which private incentives lead people in productive directions. Private incentives should coincide with the public interest. Adam Smith argued that market economies do this very well. IBM, for example, is trying to turn a profit, but in so doing is led to produce products that are very valuable to society as a whole.

The alternative is to have an incentive structure that encourages so-called rent seeking: where the policy structure is such that individual incentives lead people to improve their own situation, not by creating new wealth, as with IBM, but simply by taking wealth away from others. Theft is a form of rent seeking, with obvious negative consequences. Resources devoted to theft or to preventing theft are obviously wasted from the overall social point of view, much like the arms race. The policy environment also creates more subtle rent-seeking incentives. If government policy makes a practice of subsidizing bankrupt firms, then firms have strong incentives to devote resources to lobbying governments rather than focusing on productive activities. In effect, shareholders and workers of these firms are seeking wealth transfers from society at large.

It has been argued facetiously that the decline of U.S. productivity growth has coincided with the growth of the legal profession. Most of what the legal profession does relates to trying to obtain transfers from others. Tax lawyers help firms and individuals avoid paying taxes, civil suits involve one party trying to obtain money from another, divorce lawyers help couples use up resources fighting over their combined wealth, and so on. Obviously, society needs a legal system to enforce contracts, settle disputes, and contribute to the maintenance of what are viewed as fundamental rights. However, a society that devotes a large fraction of its collective abilities and resources to individual fighting over shares of the total economic pie, rather than to increasing the size of the pie, is going to perform poorly. In Canada, for example, there has been a tendency to substitute comparatively simple and inexpensive arbitration procedures for lawsuits. Job-related injury disputes are settled in this way, and competition policy recently has been changed over to a similar format. This is the kind of policy that can form a very important part of the economic background.

Perhaps the most important part of economic background is simple policy and economic stability. Countries with high and uncertain inflation rates, for example, seem to perform more poorly than countries with low and stable rates, even though short-term growth usually can be obtained by monetary expansion and rising inflation. Countries, such as Canada, which change their corporate tax policies with every budget, will succeed only in making investment generally more risky and less attractive. At a more extreme level, imminent fear of revolution or expropriation is likely to prevent the development of any industry that requires long-term investments.

Finally, I would like to draw attention to one major problem that I foresee for trade policy in the future. World population continues to grow at a very rapid rate, with most of the growth coming in less-developed countries. Some of these countries are well-enough organized to take part in international trade. As these countries increase their trading activity, there will be downward pressure on the return to the factor whose supply is increasing: low-skilled labor. Low-skilled workers in the industrial countries will find themselves increasingly in competition with low-wage workers overseas, putting downward pressure on their incomes. This problem is already obvious in industries such as clothing, textiles, and footwear, and is becoming obvious in other industries as well. There are still gains from trade, of course, but in the industrial countries those gains will accrue to the factors that are relatively scarce overseas: human capital, physical capital, and some natural resources. This basic economic force, clearly presented in standard trade theory, will tend to increase inequalities in income and wealth within the industrial countries if left to operate freely. Because of this pressure, I expect growing protectionist movements in most industrial countries, probably under the guise of industrial policy.

In addition to countries that are well-enough organized to trade effectively on world markets, other rapidly growing countries in Africa and elsewhere are not well integrated into the world economy. Most of these countries are in terrible condition and do not pose a threat to low-skilled workers in the industrial countries through trade. However, pressures arising from illegal immigration, political unrest, and ecological decay, caused by excessive rates of population growth in such countries, will be felt in the industrial countries.

It is true that increasing population need not put downward pressure on living standards if capital accumulation and improvements in technology and managerial efficiency are sufficiently rapid. For most of the time since the industrial revolution, such improvements have more than compensated for increasing population growth. But I suggest that the record of the past decade, particularly in Africa, is more discouraging. In short, I suspect that the greatest long-term economic problem is the excessively rapid population growth of the Third World, and I am surprised that the subject does not receive more attention.

Brander's 'Shaping Comparative Advantage': Some Comments

Paul A. Geroski

Let me start by congratulating James Brander for producing an interesting and informative paper. I come to the subject area of industrial policy as an industrial economist, and so found the discussion of trade theory in his second and third sections particularly helpful. The principle of comparative advantage suggests that there are possible gains to be had from complementing Brander's discussion with some mention of topics that might naturally occur to an industrial economist, and this is what I propose to do. This course of action leads me to stress several points of disagreement with the Brander discussion, but this "presentation bias" should not obscure the credit I think he deserves for advancing the industrial policy debate.

The first of four issues that I wish to explore is Brander's definition of industrial policy. He argues that: "industrial policy should be thought of as 'coordinated targeting', in the sense that it should involve some form of industry-, firm-, or project-specific policy (targeting), and that it should arise from some coordinated government plan to influence industrial structure in particular, well-defined ways (coordination)." While this seems reasonable enough at first sight, I think that it glosses over several important issues. A useful way to see the point is to ask what distinguishes industrial policy as conceived by Brander from antitrust policy. Antitrust policy is certainly firm and/or industry specific, and it most definitely follows from an overall strategy of influencing industrial structure. Similarly, the Brander criteria do not appear to distinguish industrial policy from regulation. I think that there are two reasons why these distinctions are worth making as explicitly as possible.

First, it is important to distinguish industrial policy from antitrust and regulation because they spring from very different motivations and use very different tools. Antitrust and regulation are restraining policies, designed to tinker with markets in minimalist ways and to correct problems that arise from time to time in what are otherwise thought to be well-functioning markets. By contrast, industrial policy is a much more positive and interventionist policy, designed to hasten the development of new markets or to rationalize old ones thought to be in deep trouble. Government-business relations in the one are necessarily antagonistic, but are cooperative (in principle) in the other. The one was inspired, *inter alia*, by turn-of-the-century monopolistic abuses, the other by the postwar Japanese economic miracle. The one operates via merger prohibition, restraining orders, public examination of pricing decisions, and so on; the other by subsidies, public-private joint ventures, and so on. One reason for stressing this rather obvious point is that one often encounters the argument that the best possible industrial policy is one that relaxes antitrust restrictions. This may be — although I very much doubt it — but it is an issue that ought to be addressed explicitly, and this can only occur if the two types of policy are kept distinct.

Second, the failure of the Brander definition to distinguish among the variety of policies toward industry hides the deep conflicts that exist between them and inhibit their execution. One that is particularly vexing is the conflict that arises from R&D joint ventures. The problem here is that interfirm cooperation in R&D may be essential to the development of technology in certain sectors, but it gives rise to the distinct possibility that cooperation in this domain may facilitate collusion over prices.[1] A very similar type of policy conflict has emerged recently in Europe in a slightly different context following a French memorandum to the European Council (September 1983).[2] France's worry about Europe's relative competitiveness led it to stress the need for reducing intra-European trade barriers and for stimulating intra-European cooperation. In the memorandum, France took the view that this need for cooperation to create European "superfirms" was so pressing as to override standard antitrust worries, and it wished to see member states use the Community-wide market and not national markets as the relevant market for assessing the extent of monopolization. The issue came to a head with the (French-government-inspired) merger proposed between Grundig (West Germany) and Thomson-Brandt (France), which the West German cartel office did not approve — the merged firm's share of the West German market would have exceeded 55 percent. The merger, launched in the spirit of a positive industrial policy, about which, to be fair, the West German government was less than enthusiastic, grounded on the rocks of competition policy.

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[1] R&D cooperation is still relatively rare in Europe, but it is a phenomena of growing importance. For a discussion of the issues, see A. Jacquemin and B. Spinoit, *Economic and Legal Aspects of Cooperative Research: A European View* (Brussels: Centre for European Policy Studies, 1985). This policy conflict has been apparent in Japan for quite a while. C. Brown argues that "there has always been a tension between MITI [Japan's Ministry of International Trade and Industry] and the Free Trade Commission...in which MITI has tended to have the upper hand. Anti-monopoly legislation has always been tailored to meet the needs of industrial policy as perceived by MITI" ("Industrial Policy and Economic Planning in Japan and France," *National Institute Economic Review* [1983]: 63).

[2] My account of this follows J. Pearce and J. Sutton, *Protection and Industrial Policy in Europe* (London: Routledge & Kegan Paul, 1986).

The point, then, is that government policy impinges on specific firms and industries for specific purposes in a variety of ways, and that there is nothing to be gained by grouping all this activity together under one umbrella and pretending that it is a single type of policy, much less a coherent one.

There is in the Brander discussion a clear feeling that industrial policy ought to be based on the standard types of market failure: monopoly power, public goods, externalities, and informational market failures. Aside from a fear that this policy stance tends to make industrial policy the handmaiden of antitrust policy, I think that it is a rather narrow basis on which to build policy. There seem to me to be two further areas of concern that might justify designing an industrial policy that goes beyond regulating markets to control market failure.

First, there is a certain type of what one might call "political market failure", which arises from the activity of special-interest groups and which generates strong pressures for industrial policies of particular types. Brander suggests that this kind of rent-seeking activity "weakens the case for any kind of active policy." In contrast, my feeling is that the principal effect of this activity is to create a bias toward policies supporting traditional industries, and that a case for active policy can be made at least in part to correct this kind of bias.[3] The bias seems to me to emerge from the fact that existing, large-scale, traditional industries have well-defined constituencies — often in marginal areas whose political clout is large — while new, high-growth industries of the future do not. Hence, the special-interest activity of the former is likely to overwhelm that of the latter, leading to an unbalanced allocation of policy resources. A positivist industrial policy stressing the development of new sectors may enable one to avoid the seemingly endless subsidizing of the old to which democratic political systems often seem prone.

My second concern with market failure as the sole rationale for industrial policy intervention is that I take adjustment seriously as a potential rationale for policy intervention. Brander argues: "There is an appropriate pace for adjustment, which, in the absence of externalities or other major market failures, will be found by the market....[H]owever, it [is a] mistake to try to increase the speed of adjustment beyond its natural rate." I see no obvious reason to think that markets will adjust at the appropriate pace; indeed, there is a long tradition of thinking in economic theory that contrasts the likely efficiency of competitive markets in solving static allocation problems with the strong suspicion that their dynamic performance will be less than satisfactory.[4] Empirically, anyone who has studied the diffusion of innovations or the speed with which entry affects the market performance of leading firms cannot but be impressed with the long time it appears to take markets to work.[5] Markets can be very slow at times, and it seems to me that a case can be made for trying to identify when this occurs, and what might be done about it.

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[3] It seems to me that one can see this point very clearly in the United Kingdom. Although the United Kingdom officially disclaims industrial policy, a growing sectoral intervention is emerging in response to company failures in vehicles, shipbuilding, and so on. The pressure to intervene and prevent extreme regional distress by supporting traditional sectors in danger of collapse is very difficult to resist; the upshot is that less than one-third of sector-specific support in the United Kingdom goes to high-growth sectors. Hence, the United Kingdom supports numerous lame ducks, eating up resources that could be devoted to developing alternative industries, which, in due course, will replace these older, more traditional sectors. On the details of U.K. Industrial Policy, see United Kingdom, National Economic Development Office, *Industrial Policy in the U.K.* (London, 1982).

My third point concerns issues that might be regarded as being within the domain of industrial policy but that Brander does not discuss extensively. Here, my observations are as likely to spring from my European location as from my background in industrial economics. Let me concentrate on two points.

First, there is a growing focus of interest on the question of what type of corporate structure is likely to achieve static efficiency and to be able to cope with the need for flexible responses to exogenous events (these are likely to be conflicting desiderata). This concern has arisen in Europe from long-standing debates on nationalization and, more recently, privatization, and has been fueled by a growing concern with the performance of financial institutions. (The contrast is often made between the distant, hands-off attitude of U.K. financial institutions, and the rather more actively interventionist approach of West German banks.) Interest in this area also has arisen from dissatisfaction with highly confrontational industrial relations practices, and has led to a lot of interest in worker-managed enterprises and cooperatives. This concern with organization on the shop floor recently has been combined with the macroeconomic arguments of Martin Weitzman to arouse a lot of interest in profit-sharing schemes. Needless to say, much of this debate has been bound up in discussions about the relative advantages of large and small firms, and has led to the proliferation of all kinds of policies to aid small businesses.[6]

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[4] For a classic in this tradition, see J.M. Clark, *Competition as a Dynamic Process* (Washington, D.C.: Brookings Institution, 1961). Recent work on sequential competition suggests that markets can be "too fast" or "too slow". For example, B.C. Eaton and R. G. Lipsey ("The Theory of Market Pre-emption: The Persistence of Excess Capacity and Monopoly in Growing Spatial Markets," *Economica* 46 [1979]: 149–158) discuss competition in growing spatial markets and show that the drive to pre-empt potential entrants leads to investment "too soon", and so to persistent excess capacity. In a slightly different context, the lumpy investment model of R. Gilbert and R. Harris ("Competition with Lump Investment," *Rand Journal of Economics* 15 [1984]: 197–212) generates no presumption that markets are either "too slow" or "too fast" — although, by default, one seems led to the conclusion that they are almost certainly not "just right". For a survey of work on sequential competitive processes, see P. Geroski and A. Jacquemin, "Dominant Firms and Their Alleged Decline," *International Journal of Industrial Organization* 2 (1984): 1–28.

[5] U.S. Steel's rather uninspiring performance over the past 85 years or so is a rather prominent example of how weak dynamic market forces can be in certain cases: "in the long run, competition does triumph. But, in the long run, when an industry behaves the way that the U.S. steel industry behaved, the industry is likely to be moribund" (F.M. Scherer, "Regulatory Dynamics and Economic Growth," in M. Wachter and S. Wachter, eds., *Towards a New U.S. Industrial Policy* [Philadelphia: University of Pennsylvania Press, 1983], p. 309). It is my impression from working in this area that, while extreme, this is by no means a special case.

Second, Brander's paper focuses on the question of whether or not to intervene and generally neglects the problem of how to do so. This second question seems to me to be important not only because discussions about the appropriate mode of intervention are at the forefront of much current policy debate, but, more fundamentally, because whether or not one intervenes depends rather crucially on how well one can do so. In order to underline this point, I would like to briefly touch on four examples.

(1) Consider support for innovation and R&D.[7] Recent work, building on evidence derived from studying 50 major clusters of innovations over the past half century, suggests that the most important way that governments affect innovation is through demand (or procurement policies) and that the least important is through subsidies. The problem with subsidies arises particularly when they are used to support commercial development (not basic research), and there is some evidence to suggest that governments often are left to finance second-best projects.[8] A practical implication of this point is that it seems unlikely that one will wish to contemplate extensive support in consumer goods sectors where governments are not major buyers, since government support here almost certainly will have to operate via subsidies on the commercial development of products. By contrast, support in areas such as microelectronics, where governments have always been major purchasers, seems more feasible. Thus, support for innovation is an area where limitations

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[6] A certain amount of this debate can be found reflected in A. Jacquemin, ed., *European Industry: Public Policy and Corporate Strategy* (Oxford: Oxford University Press, 1984); and in P. Geroski and A. Jacquemin, "Industrial Change, Barriers to Mobility, and European Industrial Policy," *Economic Policy* 1 (1985): 169–218.

[7] They are not, of course, the same thing. Science policy in the 1950s and 1960s, inspired by the success of the Manhattan Project and spurred on by Sputnik, was all about building up strong R&D capability. Since the 1970s, such policies have taken a more balanced view, stressing the results of R&D as much as its production, and so emphasizing innovation and diffusion. See C. Freeman, *The Economics of Industrial Innovation* (Cambridge, Mass.: MIT Press, 1986), Chapter 9.

[8] This is the general conclusion of the Six Countries Programme on Government Policies Toward Technological Innovation. As convenient a source as any for a summary is R. Rothwell and W. Zegveld, *Industrial Innovation and Public Policy* (London: Frances Pinter, 1981).

on the mode of intervention are likely to limit the application of policy in important ways.

(2) Consider financial support of small firms. Should this take the form of loans, grants, or equity encouragement schemes? In fact, all three types of policy operate at the moment in the United Kingdom (the Loan Guarantee Scheme; the Small Engineering Firms Investments Scheme and the Enterprise Allowance Schemes; and the Business Expansion Scheme). While it is by no means clear, it seems to be the case that the first two create jobs at roughly the same cost per head (£2,500–3,000 or more), but that in both, only 50 percent of the money spent is genuinely additional (both are also suspected of creating major displacement). The Business Expansion Scheme appears to spend between £8,000 and £13,000 per job created. By contrast, there are (literally) one or two private-sector schemes started by firms forced to make large-scale redundancies in certain areas (British Steel and Pilkingtons are the famous examples). While it is very difficult to be sure, it appears that the cost per job created in these may actually be as low as £600 per head. It is quite possible that if loans, grants, and equity provisions through tax concessions are the best that public policy can manage, then it may be better to do nothing at all in this area (except to encourage private-sector initiatives).[9]

(3) It is frequently the case that government intervention to prevent certain plant closures is necessary. This arises when firms hit temporary difficulties, or when moderately profitable subsidiaries (located in remote areas) of large firms fail to meet internal target rates of return. One method of intervention is clearly through subsidies, but subsidies dull incentives and have a way of becoming semipermanent. This particular problem has led a number of people to argue that facilitating employee buyouts might have a number of advantages over more traditional support schemes, and there is some evidence that this may indeed be the case.[10] If this is so, it seems likely that the use of such a mode of intervention might increase the advisability of government intervention in cases of distress, since it seems both relatively cheap and unlikely to produce major "side effects".

(4) Finally, let us return again to the question of public procurement, and ask how it might be structured. U.S. procurement policy has provided support for small firms (much enhanced by the *Small Business Act* of July 1982 and the U.S. Defense Department's Small Business Innovation Research Program). This has led to extensive small-firm innovative ac-

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[9] My understanding of these schemes derives from work done by my colleague Colin Mason in the Geography Department of Southampton (particularly from a series of unpublished papers written with R. Harrison) and by David Storey in CURDS at the University of Newcastle-upon-Tyne. They are not, of course, responsible for my misapprehensions in this area.

[10] This case is made in K. Bradley and A. Gelb, *Worker Capitalism: The New Industrial Relations* (London: Heinemann, 1983).

tivity in sectors such as microelectronics, computer-aided design, and so on. By contrast, European public procurement is highly concentrated in the hands of "national champions" or, more recently, the odd European consortium. What appears to be the case is that the U.S. system has a number of advantages over the policy of sticking to national champions, and that the record of European consortia is not all bad — for example, the case of Airbus Industries.[11] Thus, while procurement policy may substantially encourage innovation, and while it may do so far more effectively than do subsidies, its optimal mode of application is unclear. Until one can evaluate the national champions procurement policies prevalent in Europe, it seems foolhardy to recommend a wholesale shift in innovation support policies from subsidies to procurement-based policies.

In short, what one can do depends on the tools available. I would have thought that it would be useful to shift discussion away from the question of: Should we have an industrial policy?, to that of: Can we design an effective industrial policy that does not create too many undesirable side effects?, if only because the latter question is the prior and more fundamental one.

My final set of remarks relate to Brander's fifth section, and to the material on empirical evidence, methodology, and future research.

Brander suggests that: "the most important area of research is estimation of crucial parameters associated with industrial organization, particularly the extent of economies of scale, and also behavioral parameters that reflect how rival firms interact." While I share Brander's view of the importance of this type of work, quite a lot already has been done along these lines. The techniques for analyzing these problems are known, and much experience has been gained in using them. They are, thus, ready for use in carefully designed, policy-specific applications. Somewhat more important in my view is the relatively neglected area of empirical work on market dynamics. I sense from reading Brander's section on industrial policy that the real debate in much of the literature is about whether adjustment problems exist, and whether adjustment policies are needed. Market dynamics is an area about which we know very little, and there is much good empirical work to be done on the properties of market processes, competitive or otherwise. It seems to me that the agenda for future research ought to involve questions such as: How fast do markets rationalize excess capacity? How fast does entry occur in response to market stimuli, and how much innovation does it bring on its tail? Is entry a very costly method of market adjustment? Why do innovations often diffuse slowly? Why do some industries decline into crisis and appear to be unable to extricate themselves from it without help? In short, empirical research of market processes ought to be accorded a high priority.

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[11] See, for example, the discussion in H. Ergas, *Why Do Some Countries Innovate More Than Others?* (Brussels: Centre for European Policy Studies, 1984), which extolls the virtues of U.S. methods. On the Airbus consortium, see J. Rallo, "The European Communities Industrial Policy Revisited: The Case of Aerospace," *Journal of Common Market Studies* 22 (1984): 245–267.

Further, I sense that this area poses new methodological challenges for empirical research. There are only a small number of countries whose different industrial policies will be informative for policy design in Europe, the United States, Canada, and Japan. Such policies as we know about have been applied only in a small number of sectors in a limited variety of circumstances. It is plain that if we are ever going to learn anything, it is going to be through using "small sample" methodologies. In this respect, it seems to me quite misleading to suggest that the problem with case studies "is to carry out such investigations with a level of rigor at least approaching that of formal econometrics." Not only is the variation in policy initiatives much too limited for applied econometricians to get their teeth into,[12] it is often the case that applied econometrics cannot identify the nuances that are available in case studies, as Brander notes. It seems to me that the drawback of case studies is lack of perspective, rather than lack of rigor, and that this can be corrected by carefully structured comparative studies. Thus, taking one policy problem and comparing the four or five policies that have been developed in response to it seems to me to be a very good way to learn much about what can and cannot be done. If, in addition, such comparative work can push beyond qualitative evaluation and even into policy simulation, so much the better.

To sum up, James Brander has set himself the task of bringing recent work in international trade theory and policy to bear on the question of industrial policy. He has provided an interesting and informative paper, and has certainly succeeded in his goal. One must push on, however, from this excellent start. My view is that it would be worthwhile to move on and explore problems arising from policy conflicts, modes of policy intervention, and market dynamics.

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[12] Furthermore, since policies are developed in response to earlier policy failures and successes, the various "observations" one has are not independent of each other.

Comments on Brander's 'Shaping Comparative Advantage': Creating Advantage, an Industrial Policy Perspective

Laura Tyson

The new trade theory and industrial policy literatures that are the focus of Brander's paper represent two distinct currents of thought emanating from two distinct communities of scholars using different languages and methodologies and addressing different audiences. What ties these communities together is their shared interest in real changes in the international economic environment that have profound implications for trade theory and policy. Three kinds of changes stand out.

First, the character of trade has changed. A large and growing share of world trade consists of exchanges that cannot be explained by traditional theories of comparative advantage. Intra-industry trade and trade in high-technology products are the most obvious examples. Such trade is not explainable in terms of relative factor endowments, nor is it amenable to the assumption of perfect competition on which traditional theories are based.

Second, partly as a result of the rising share of Japan and the newly industrializing countries in world trade, and partly as a result of "temporary" protectionist measures in the developed countries, nontariff barriers to trade have increased significantly in recent years. In the new, more managed and more distorted international trading environment, the traditional presumption that free trade is optimal for national economic welfare must be re-examined, and second-best solutions must be reconsidered. In addition, for both theoretical and policy reasons, it is important to understand how the many different types of trade and industrial policies that give rise to these barriers affect the welfare of different nations and aggregate world welfare.

Finally, a third major change in the world economy is the growing openness of the U.S. economy. Because of its size, the U.S. economy still exerts a significant influence on both the volume and pattern of world trade. Moreover, as the dominant architect of the postwar international trading system and the major supporter of the General Agreement on Tariffs and Trade, how the United States fares in the world economy potentially has profound implications for the international trading regime. Not surprisingly, then, evidence of a gradual but persistent erosion of the United States' competitive position has been an important impetus to research by both trade theorists and industrial policy analysts, even though these groups tend to differ significantly in their interpretation of the reasons for and consequences of this erosion.

Although motivated by and responding to the same set of real changes, the trade theory and industrial policy schools of thought differ sharply in several important respects. Methodologically, industrial policy analysts tend to rely on detailed case studies of industries or countries to support their arguments, while trade theorists rely on models that, despite or because of their theoretical elegance, do not often meet what Brander calls the "test of possible descriptive accuracy." These methodological differences, in turn, reflect differences in the audiences addressed. The industrial policy literature is targeted at the policymaking community, while the new trade theory literature is targeted first and foremost at academic economists. And this difference in target audience, in turn, reflects a more fundamental difference in normative position. Contributors to the industrial policy literature share a sense of policy activism, based on the belief that the problems they have identified are real and demand policy response. Contributors to the trade theory literature, in contrast, tend to share a position of policy caution, whether because their models yield uncertain results about the efficacy of policy or because they prefer less, rather than more, government intervention in markets, even when such intervention might prove beneficial.

Despite these differences, the common concerns of trade theorists and industrial policy analysts suggest that there are mutual gains to both sides from trade in ideas and insights. Trade theorists, as other theorists, tend to build their models on stylized facts about how the world operates, and the industrial policy literature provides rich case studies from which such facts can be extracted. Case-study evidence on the objectives and institutions of trade and industrial policies in different countries, and on the apparent effects of such policies on trade, is a necessary input to models of strategic trade policy that meet the test of descriptive relevance. Theory, in turn, can strengthen the industrial policy literature by revealing consequences of policies that are predicted by formal models but are often overlooked by less formal methods of analysis. For example, the case-study approach of some of the industrial policy literature tends to overlook the consequences of policy measures taken in one country on policy reactions in other countries. Such spillover effects are often the focus of trade theory discussions.

Brander's paper contains a lucid, comprehensive summary of many of the main propositions of both the trade theory and industrial policy schools, and provides a useful starting point for a mutually beneficial exchange of ideas between them. In my comments, I will try to further this exchange by identifying some of the researchable propositions that suggest themselves from the work which I and my colleagues at the Berkeley Roundtable on the International Economy (BRIE) have done in recent years. For the purposes of this discussion, this work may be taken as representative of the industrial policy literature, although as Brander correctly notes, there are different views among contributors to that literature, even about the definition of industrial policy and certainly about its desirability in a given set of circumstances. Also, industrial policy, like supply-side economics, is a politically and ideologically charged phrase that tends to obfuscate rather than clarify the actual issues involved in important theoretical and policy debates.

Our research at BRIE yields three major conclusions, each of which suggests a number of researchable propositions that are of both theoretical and empirical relevance to those interested in international trade. First, our case-study results indicate that government policies can and do have enduring effects on competitive outcomes in international markets. Second, our research suggests that there has been a long-term erosion in the United States' competitive position in world trade. This erosion is not simply the result of the inevitable catch-up of the rest of the world to U.S. productivity levels, but the result of policy actions both in the United States and abroad that have influenced the pace and extent of the catch-up. An obvious implication of this perspective is that the erosion in the United States' position should be of concern to those interested in, or responsible for, making U.S. economic policy. Third, our focus on high-technology industries leads us to the conclusion that a fundamental revolution in both production and communications technology is under way, and that this revolution will have profound effects on the determinants of international trade patterns and on the ability of national trade and industrial policies to affect national and world economic welfare. In the remainder of my discussion, I elaborate on each of these three conclusions, trying to draw out their implications for promising research directions.

The Effects of Government Policy on Competition in International Trade

Trade theorists have been developing models to demonstrate the theoretical possibility that government policies can have a permanent effect on trade flows and on the distribution of welfare resulting from such flows. At the same time, several groups of scholars, including some area specialists, some industry specialists, and many of the contributors to the industrial policy literature, have been accumulating case-study and other evidence to demonstrate that this theoretical possibility is an empirical reality. The common idea shared by these different groups is that, for most kinds of trade flows, comparative advantage is not given by resource endowments but is shaped over time by the actions of both business and government. This idea encompasses both a macro and micro argument.

At the macro level, it seems undeniable and even uninteresting that government policies can affect comparative advantage over time by influencing the quantity and quality of labor, capital and technology. A comparative advantage in capital- or technology-intensive industries is not an immutable fact of nature. Rather, it is the result of a host of interrelated, economy-wide policies that affect the incentives to save, to invest, to acquire human capital, to innovate, and to diffuse technology. This point, although basic, is often overlooked by those who view the gradual erosion in the United States' competitive position in such industries, or the gradual strengthening of Japan and other East Asian countries in the same industries, as the result of a natural catch-up process. Both the extent and the pace of the catch-up were influenced significantly by policy choices in all of the countries involved.

Much of the industrial policy literature addresses itself to the macro aspects of how government policies affect comparative advantage over time. There are a number of studies[1] that examine a variety of government policies to determine how they have affected saving, investment, technological change, and productivity growth in the United States and in several of its trading partners. Although it is difficult to come up with a single quantitative measure of the effects of such policies on macro determinants of comparative advantage over time, a strong qualitative case for the critical influence of national policy choices on these determinants has been made.

The notion of creating comparative advantage at the micro or industrial level is both more interesting and more controversial. This notion rests on the observation that a large and growing part of world trade consists of exchanges that do not reflect national differences in resource endowments, even those resources whose quantity and quality are influenced by government policy. Instead, such trade reflects apparently arbitrary or temporary advantage resulting from static or dynamic economies of scale, from shifting positions in technological leadership, or from product differentiation and other forms of "imperfect" nonprice competition. For trade in these products, it seems obvious that national policies can have an enduring effect on trade flows and national welfare.

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[1] See, for example, Lester Thurow, *The Zero-Sum Solution* (New York: Simon and Schuster, 1985); Bruce R. Scott, "U.S. Competitiveness," in Bruce R. Scott and George C. Lodge., eds., *U.S. Competitiveness in the World Economy* (Cambridge, Mass.: Harvard Business School Press, 1985); Steve Cohen et al., "Competitiveness," Vol. III, *Global Competition: The New Reality*, Working Paper for the President's Commission on Industrial Competitiveness (Washington, D.C., November 1984); and Robert Reich, *The Next American Frontier* (New York: Times Books, 1983).

The empirical literature focusing on the micro aspects of how government policies shape trade flows has relied mainly on case studies of individual countries and individual industries to address three questions. First, are countries such as Japan, France, and South Korea actively using policies to target or promote specific sectors? Second, what policies have they relied on to realize their targeting objectives? Third, have these policies affected their national trading patterns? A fourth question of great importance is whether the benefits of such policies in terms of national welfare gains have outweighed their costs. As is indicated below, this question is extremely difficult, if not impossible, to answer because of the long lags and spillover effects involved between the targeting of one sector at one point in time and the consequences for that and other sectors of the economy over time.

Our work at BRIE, which has focused on high-technology sectors and on Japan for case-study evidence, indicates that the Japanese government has used a host of interrelated policies, some aggregate, some industry-specific, some formal, some informal, to target certain industries, and that these policies have had an enduring effect on Japanese trade patterns in specific sectors.[2] These conclusions are shared by a variety of other regional specialists and industry analysts who have studies Japanese policy in specific industries during the postwar period.[3] Our own case-study work demonstrates the role of policy in the evolution of Japanese production and trade in the consumer electronics, semiconductor, and telecommunications industries. Our evidence suggests that an interrelated set of protectionist and promotional policies has given Japanese producers the advantages of large-scale production and cumulative production and research experience that have been critical to their export successes in related products.

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[2] The relevant BRIE research includes John Zysman et al., "U.S. and Japanese Trade and Industrial Policies," BRIE Working Paper no. 2 (Berkeley Cal.: University of California, March 1984); Michael Borrus, Laura Tyson, and John Zysman, "Creating Advantage: How Government Policies Shape International Trade in the Semiconductor Industry," in Paul Krugman, ed., *Strategic Trade Policy and the New International Economics* (Cambridge, Mass.: MIT Press, 1986), pp. 91–113; Michael Borrus, James Millstein, and John Zysman, "Responses to the Japanese Challenge in High Technology: Innovation, Maturity and U.S.-Japanese Competition in Microelectronics," BRIE Working Paper no. 6 (Berkeley, Cal.: University of California, July 1983); Michael Borrus et al., "Telecommunications Development in Comparative Perspective: The New Telecommunications in Europe, Japan and the U.S.," BRIE Working Paper no. 14 (Berkeley, Cal.: University of California, May 1985); and Steve Cohen and John Zysman, *Manufacturing Matters: The Myth of a Post-Industrial Economy* (New York: Basic Books, forthcoming).

[3] See, for example, the work of Chalmers Johnson, *MITI and the Japanese Miracle* (Stanford: Stanford University Press, 1983); Kozo Yamamura, ed., *Policy and Trade Issues of the Japanese Economy* (Seattle: University of Washington Press, 1982); and idem, "Caveat Emptor: The Industrial Policy of Japan," in Krugman, ed., *Strategic Trade Policy and the New International Economics*.

In our view, the Japanese approach to these and other industries is an industrial policy approach in the sense that it is motivated by the goal of guiding or influencing the structure or composition of the economy in specific directions. In this sense, industrial policy is defined more by its objectives than by its techniques. Certainly, industrial policy must be construed much more broadly than trade policy, although it may encompass traditional trade policies such as tariffs, tangible and intangible nontariff barriers, and related policies such as controls over direct foreign investment. In the Japanese case, these kinds of policies have been used in conjunction with a variety of other policies, including tax and subsidy policy, financial and interest rate policy, research and development policy, and antitrust policy. The actual mix of policies has changed significantly over time, and many observers argue that both the extent and the strength of policy intervention have declined since the early 1970s. Nonetheless, the long-term effects of earlier or continuing policy intervention on trade patterns in targeted sectors persist because of the long-term nature of the advantages created by such intervention.

A careful examination of Japanese industrial policy indicates that it has been what might be called "market conforming" or "market promotional" in its objectives. It has been designed to promote or accelerate the development of sectors deemed to be both privately and socially profitable and to manage the decline of sectors deemed to be both privately and socially unprofitable. This does not mean, of course, that decisions based on this principle have always turned out to be correct.

Targeting the steel and shipbuilding industries may have been a wise market decision in the 1950s and 1960s, but turned out to be a questionable one in the 1970s. The same may turn out to be the case for the semiconductor industry in the 1990s. Both government and private decisionmakers make decisions that are wise by one set of market parameters but appear foolish by another. This is simply an inescapable result of decisionmaking under uncertainty.

From a standard economics perspective, industrial policies to manage industrial decline can be understood in terms of adjustment costs. Economists tend to pay lip service to the notion of such costs. After stating that they exist and that they might even be substantial, economists tend to dismiss them as "market imperfections" and to pursue their analysis of the advisability of policy intervention as if they did not exist. Thus, Brander in his paper refers to the "natural speed of adjustment," as if there is some optimal adjustment pace that the market will find to minimize costs.

Yet, as Brander himself argues elsewhere in his paper, there are many institutional factors in what he calls the "background environment" that influence economic performance, including the pace of market adjustment in different sectors and economies. Country size, the regional concentration of different industries, the skill, mobility, and unionization of the labor force, the nature of antitrust and bankruptcy laws, industry concentration, the relative reliance on debt and equity finance, and the nature of the relationship between bank management and firm management are only a few of the "institutional" factors that are likely to influence the magnitude and distribution of adjustment costs associated with a given degree of structural change. To call these factors "market imperfections" and then ignore them is to miss the point that their effects can be mitigated by policy. It is this point that motivates much of Japanese industrial policy, including the important recession and rationalization cartels, and that is missed by U.S. academic economists and policymakers who tend to view the pace and cost of market adjustment as optimal.

Even economists who are willing to entertain the notion that industrial policy may be "market conforming" and beneficial when used to moderate the adjustment costs associated with industrial decline are often unwilling to acknowledge any defensible rationale for market-promoting industrial policy to accelerate the growth of profitable industries, except in the presence of externalities or market imperfections in the usual sense. Such economists find the assertion that Japanese industrial policy worked to promote firms "to adopt successively newer technology and to invest rapidly"[4] puzzling at best. Why, if these activities were profitable by market criteria, did firms need to be promoted? One interpretation is that they did not need such prompting, that things would have turned out rather as they did without industrial policy, in which case such policy had no real effect. An alternative interpretation is that policy promoted firms to do more than they otherwise would have done, in which case, in the absence of externalities or other imperfections, there were hidden welfare costs associated with what was defined as market-conforming policy. Since the usual tendency among economists is to treat imperfections or externalities as annoying exceptions to the market, rather than as the rule in most markets, and to define them in quite narrow, precise, and quantifiable ways, this alternative interpretation is the one usually given most support by academic economists.

If market imperfections or externalities play a peripheral role in conventional economic analysis, they are the center of analysis in both the industrial policy and trade theory literatures. A starting point in both literatures is that economies contain "strategic" activities, where capital and labor earn a higher return than they otherwise would or which generate special benefits for the rest of the economy.[5] The real debate is over how widespread and important such strategic activities are. If one believes that competition quickly eliminates any large deviations between what equivalent qualities of labor or capital earn in different sectors and that market prices are good indicators of social return, then there are few strategic activities that can benefit from market-promoting policies. If, instead, one believes that there are persistent and large deviations in factor returns between different sectors and that, because of spillover effects from one sector to the rest of the economy, prices are often poor indicators of social return, then the scope for beneficial market-promoting policies can be quite broad.

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[4] Yamamura, "Caveat Emptor," p. 202.

[5] Paul Krugman, "Introduction: New Thinking about Trade Policy," in Krugman, ed., ***Strategic Trade Policy and the New International Economics***, p. 14.

An examination of Japanese industrial policy suggests that the latter perspective motivated policy action in that country. For example, in the 1950s and 1960s, steel and shipbuilding were promoted because they were believed to provide substantial spillover benefits in the form of infrastructure for other industries. Proponents of this view argue that Japanese success in other industries, such as autos and machine tools, was based in part on the availability of cheaper, higher-quality steel and on cheaper access to imported raw materials that the infrastructure provided. From this perspective, an evaluation of the wisdom of targeting steel and shipbuilding in the earlier phase of development requires an assessment of spillover effects of this type on other sectors at a later phase of development, something that is extremely difficult to do, and something that neither the skeptics nor the believers in the wisdom of Japanese industrial policy have tried to do. Three questions remain open: To what extent does the competitive success of Japanese manufacturing industry in a variety of capital-intensive, raw-material-intensive, and energy-intensive sectors depend on the early targeting of certain basic infrastructure sectors? How do the benefits of success in these sectors compare to the costs of targeting? And, in the absence of such targeting, were capital and product markets perfect enough to generate a socially optimal rate of investment in these infrastructural activities.[6]

More recently, Japanese market-promoting policies have concentrated on high-technology sectors in which standard externality arguments about the returns to R&D and innovation provide a *prima facie* conventional case for a "strategic"-activity argument. Yet even here, the notion of spillover effects that seems to motivate Japanese policy and to captivate its industrial policy devotees is broader than the usual externality notion. As they did with steel and shipbuilding in the past, the Japanese view semiconductors, computers, and telecommunications as the infrastructure on which the future competitive success of a variety of industrial sectors depends. The Japanese see a policy of promoting R&D, investment, and growth in these infrastructural industries as generating beneficial effects throughout the economy. A conventional economic analysis would argue that as long as the returns to R&D are appropriable by the innovating firm and as long as there are no product-market or capital-market imperfections, then market incentives would be sufficient to promote the optimal R&D, investment, and growth outcomes. Leaving aside the appropriability issue for the moment, this argument overlooks the fact that there are major setup costs and irreversibilities involved in R&D and investment in these activities. One may call these market imperfections, but they are the features of economic reality that provide a rationale for market-promoting activities. As Weitzman[7] pointed out so insightfully several years ago, in a situation of uncertainty about future costs and benefits, where the failure to produce an adequate output level of a particular product can have large, deleterious effects on social welfare, it may be a better strategy to rely on nonprice signals than to depend on market signals. This kind of notion seems to provide a broad, underlying motivation for Japanese industrial policy throughout the postwar period.

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[6] According to a conventional economic interpretation, since the returns of lower input prices in user industries resulting from investments in steel and shipbuilding are pecuniary, there is no reason to expect that the market would underinvest in such infrastructural activities (see, for example, Robert Lawrence, *Can America Compete?* [Washington, D.C.: Brookings Institution, 1984]). This interpretation overlooks obvious imperfections in the product markets for these kinds of activities and what economists

The literature on the economics of innovation also suggests other reasons — besides those of risk, appropriability of returns, and increasing returns — for market imperfections and externalities in high-tech industries. Scholars of the R&D process often emphasize the systemic nature of many important innovations. In contrast to a stand-alone or autonomous innovation, which can be introduced without modifying other components or products, a systemic innovation may not only permit but require significant modifications in other components or products. When an innovation is systemic, the speed of innovation and diffusion will depend on the degree of coordination among interdependent actors, any of whom will face significant risk acting alone. This has led some scholars in the industrial organization literature to conclude that systemic innovations require the kind of coordinated information flows and investment plans that are fostered not by arms-length, price-mediated relationships among firms but by stronger forms of organizational linkage, such as vertical integration. From a national perspective, this suggests that government policies to promote the flow of technological and R&D information among firms or to promote the coordination of investment and R&D activities can speed the innovation and diffusion process. This is another rationale for a variety of Japanese promotional policies, such as developmental programs aimed at joint development of generic technologies in the semiconductor and computer industries.

Finally, another type of spillover effect often overlooked in standard externality discussions is the effect of research and innovation in a particular firm or industry on the ability to innovate. The history of technological change in a variety of industries and countries suggests that it involves the creation of an ability to innovate embodied in a pool of specialized knowledge and in a specialized labor force. By its nature, this ability is not easily retained within firms or sectors but is much more easily retained within national borders. Thus, an important externality of market-promotion policies in high-technology sectors is the creation of a national pool of R&D talent and the maintenance and strengthening of the human capital necessary to innovate.[8]

If economic activities that foster a national ability to innovate are strategic in the sense that they have important externality effects in other sectors, they are also strategic in the sense that they tend to yield higher returns to both capital and labor than they could earn elsewhere in the economy. There are substantial rents to be earned from being at the frontier of technological change, where standards are determined for future products and processes and where, once standards have been established and technologically progressive industries have matured, new entry becomes more difficult.[9]

The preceding discussion of the major conclusions of the industrial policy literature on the effects of government policy at both the macro and micro levels suggests two related priorities for policy-relevant research. First, the notions of adjustment costs and externalities need to be broadened and given greater weight in theoretical studies of trade and industrial policies. Second, there is critical need for better empirical research on the effects of industrial and trade policies on economic outcomes not only in a single sector but across a number of interrelated sectors or across a whole economy. Industrial policy analysts have relied on qualitative, case-study evidence, but such evidence by its very nature cannot isolate the effects of a whole host of factors — such as macro policies, labor skills, management techniques, and world economic conditions — from the effects of specific industrial policies, nor can it distinguish among the effects of individual policies of this type. In contrast, the new trade theorists have tended to eschew empirical research altogether, while most economists involved in policymaking have tended to rely on empirical conclusions derived from relatively simple models, such as the trade policy models, that yield quantitative estimates of the effects of policy but are patently misspecified.

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[8] On this point, see Borrus, Tyson, and Zysman, "Creating Advantage"; and Paul Krugman, "The U.S. Response to Foreign Industrial Targetting," *Brookings Papers on Economic Activity* 2 (1984): 77–121.

[9] As technologically prosperous industries mature, new entry becomes more difficult, according to evidence cited in David Teece, "Capturing Value from Technological Innovation: Integration, Strategic Partnering and Licensing Decisions," Center for Research and Management Working Paper (Berkeley, Cal.: University of California, March 1986).

The Competitiveness Problem of the U.S. Economy

A second major conclusion that most contributors to the industrial policy literature share is that the United States suffers from what has come to be called a "long-term competitiveness problem". It is the perception of many policymakers and business leaders that such a problem exists, which accounts for the attention that the industrial policy literature has received. Inevitably, this attention has strengthened as the U.S. trade deficit has deteriorated over the past several years, even though the term "industrial policy" has lost favor in U.S. policy discussions for political reasons.

Among economists, including those attending this Workshop, there has been heated debate about the existence of a long-term competitiveness problem in the U.S. economy. The dominant view is that, given the correct exchange rate, U.S. firms would be able to compete successfully in world markets and the U.S. merchandise trade balance would decline dramatically. To economists and policymakers who are worried about a competitiveness problem, this view, while logically correct, misses the crucial point. Competitiveness is not simply a measure of a country's ability to sell abroad and to maintain a sustainable trade position. The very poorest countries in the world are often able to do that reasonably well by exchange-rate adjustments. If their productivity lags behind that of their trading partners, they accept a gradual decline in the value of their currency, their relative wages, and their relative standard of living.

If national competitiveness is defined in the broader sense as the ability to compete effectively in world markets while simultaneously raising real incomes, then there are several indicators that there has been a secular decline in the United States' competitive position since the mid-1960s. Among those indicators identified and examined in the industrial policy literature are: the erosion of the U.S. share in world export markets for manufactured goods, including high-technology goods, between the late 1960s and 1980, despite a major real depreciation of the U.S. dollar between 1977 and 1979; the erosion of the U.S. share of world exports of productive services, as opposed to services flows representing earnings on overseas investment, during the same time period; a protracted decline in real wages in manufacturing since 1973; and case-study and macro evidence of a decline in U.S. technological capability relative to levels realized in Japan and West Germany.[10]

Perhaps the most telling evidence of a long-term competitiveness problem comes from an examination of U.S. productivity performance. In the decade and one-half before 1983, there was a pervasive and substantial decline in productivity growth rates throughout most sectors of the U.S. economy. Moreover, for at least that length of time, productivity grew far less rapidly in the United States than it did in its major trading partners. U.S. productivity growth turned up in 1983 and 1984 in response to the economic recovery, but the improvement was no better than in previous economic recoveries and did not indicate that the disappointing longer-term trend in productivity had been reversed.[11]

As a result of two decades of relatively poor productivity growth, the substantial advantage in productivity levels that U.S. producers once enjoyed has all but disappeared. In several sectors, such as steel, autos, machine tools, and semiconductors, productivity levels in other advanced economies equal or exceed U.S. levels. If faster productivity growth persists outside the United States, as is currently the case, then what until now has been a catch-up of foreign productivity levels to U.S. levels will become a gradual fallback in U.S. productivity levels relative to those abroad.

As Brander's discussion indicates, critics of the industrial policy literature question whether there is a competitiveness problem in the United States and, if so, whether it is severe enough to merit policy concern. According to these critics, the decline in the United States' competitive position is the result of a natural and presumably beneficial catch-up process in the rest of the world. As the United States' share of world capital and skilled labor has declined and as the gap between the United States and the rest of the world in endowments of capital, skilled labor, and technological ability has narrowed, the United States' share of world trade and of trade in high-technology, skill-intensive and capital-intensive products has declined. As a result of the nature of growth in the rest of the world, U.S. terms of trade for manufactured goods have deteriorated, but estimates, such as those of Lawrence,[12] suggest that through 1980 the deterioration was relatively small. Using Lawrence's estimates, Krugman argues that the real income losses occasioned by the terms-of-trade deterioration for U.S. manufactured goods have also been small, perhaps amounting to a decline in real income growth by roughly .12 percent per year.[13] Furthermore, according to these critics, estimates of this type probably overstate the real-income losses attributable to the relative decline in the United States' competitive position because they focus on trade in manufactured goods. If, as most of these critics believe, the relative decline in U.S. manufacturing capabilities simply reflects the inevitable transition of the United States toward a services economy and a growing comparative advantage in services, then the focus on relative manufacturing capabilities characteristic of much of the industrial policy literature is misguided. Finally, even if the United States is experiencing an overall decline in its relative competitive position extending to internationally traded services — such as financial, consulting, and construction services — this should not be cause for concern since, on an absolute standard, levels of U.S. per capita income, wealth, and productivity are among the highest in the world.

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[10] For evidence on these and other indicators of U.S. competitiveness, see Cohen et al., "Competitiveness"; Thurow, *The Zero-Sum Solution*; and Scott, "U.S. Competitiveness."

[11] See William J. Baumol and Kenneth McLennan, "U.S. Productivity Performance and Its Implications," in William J. Baumol and Kenneth McLennan, eds., *Productivity Growth and U.S. Competitiveness* (New York: Oxford University Press, 1985), pp. 1–38.

[12] Lawrence, *Can America Compete?*

Contributors to the industrial policy literature, including researchers at BRIE, respond to these criticisms in several ways. First, the pace of the decline in the gap between the United States and the rest of the world in endowments of capital, skilled labor, and technology has been significantly influenced by U.S. policies that have depressed productive investment rates, allowed the educational system to deteriorate, and failed to allocate sufficient resources to civilian, commercially targeted research and development. Contrary to what Brander says, industrial policy analysts do not blame South Korea, Japan, France, and other countries for relatively poor U.S. performance. Although the industrial policy literature does recognize the danger of foreign targeting policies in industries — especially high-technology industries — that compete with U.S. exports, it focuses not on such policies but on poor domestic policies as the most important source of U.S. competitive difficulties. Japan attracts attention in this literature not so much because its policies are designed to hurt U.S. competitiveness but because they provide a standard against which U.S. policy failures become more apparent.

Second, contributors to the industrial policy literature argue that the Lawrence-Krugman measures are underestimates because they are based on the assumption that the U.S. growth rate continues to remain one-third below those of the rest of the world, as it was during the 1964–80 period. If, instead, it is assumed that the United States grows at about the same rate as the rest of the world — an assumption that seems more in line with U.S. policy objectives now that the other advanced industrial countries have caught up — the decline in the value of the U.S. dollar required to maintain trade balance in manufactured goods and the real income losses involved would be much larger.[14] Under either assumption, evidence from the mid-1960s through 1980 indicates that improvement in the U.S. trade balance for manufactured goods requires a persistent erosion in the growth of U.S. real incomes. In other words, the United States has a long-term competitiveness problem as defined in the industrial policy literature.

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[13] Krugman, "The U.S. Response to Foreign Industrial Targetting."

Third, contributors to this literature question the view that the erosion in U.S. manufacturing competitiveness is not cause for policy concern because it reflects a market-driven transition to an "information-based services economy", and a growing U.S. comparative advantage in services. There are several problems with this line of reasoning. The first is that, after deducting that part of the services trade representing capital flows, the volume of U.S. "productive" services exports is small. Second, the U.S. share of world markets for such exports declined during the 1970s.[15] Third, many services are what Cohen and Zysman[16] call "tightly linked" to manufacturing activities, in the sense that competitive difficulties in these activities are likely to cause competitive difficulties in related services. As an illustration, the erosion of the United States' competitive position in semiconductors and computers is likely to spill over into an erosion in related engineering and design services, software design, business consulting services, and repair and maintenance services. Similarly, the erosion of the United States' competitive position in capital-goods industries, such as construction equipment and robotics, is likely to spill over into an erosion in related construction, engineering, and architectural services.

Where linkages between services and products are tight, services are often specialized for particular products or even for particular suppliers. These services, together with the products they support or use, are best thought of as an interrelated system rather than as separate commodities. This is especially true for many high-technology products and their specialized support services. Under these circumstances, close, frequent communication between producers of output and specialized services is common. Such communication involves more than just the exchange of price information and often involves a substantial element of risk on both sides that results in long-term contractual relationships. For tightly linked services, it is hard to imagine how a competitive erosion in product lines in world markets would not spill over into a erosion in related services.

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[14] For example, Thurow estimates that after an initial depreciation of 38 percent required to restore balance in U.S. manufactured goods trade (as of January 1985), the U.S. dollar would have to fall at a rate of 1.8 percent per year to maintain balance if the United States were to grow at the same rate as the rest of the world (*The Zero-Sum Solution*, pp. 98–99).

[15] For evidence on the declining U.S. share in world exports of productive (nonfactor) services, see Wassily Leontief and Faye Duchin, *Automation, the Changing Pattern of U.S. Exports and Imports and Their Implication for Employment* (New York: Institute for Economic Analysis, 1985).

[16] Cohen and Zysman, *Manufacturing Matters*.

Finally, conventional economic arguments about the inevitable and, therefore, beneficial transition to a services economy fail to distinguish among different types of services and the different kinds of jobs they entail. Most services, such as retail services, restaurant and other entertainment services, and health and educational services, are driven by consumer and welfare needs. Many of the jobs in such areas are low-skilled, low-paying ones with high turnover and poor training and advancement prospects. In contrast, services that cater to business needs, such as financial, legal, engineering, and consulting services, support highly skilled, high-paying jobs. The evidence in the United States during the past several years suggests that by far the largest number of new services-sector jobs were of the first type rather than the second.[17] As the United States was losing industrial-sector jobs, many of which were highly skilled and high-paying, it was gaining low-skilled, low-paying services jobs. This job-creation and destruction pattern suggests the possibility that, as a result of U.S. competitive difficulties in world markets, "strategic" jobs — jobs that pay more than what labor can earn elsewhere in the economy — were being destroyed.

At a broader level, the notion of "good" and "bad" jobs and the new literature on efficiency wage theory capture many of the competitiveness concerns that worry contributors to the industrial policy debate. If there are good and bad jobs even in equilibrium, and good jobs have higher wages, higher average productivity, and higher valued added per worker, then competitive difficulties in sectors that support good jobs can reduce total economic welfare and industrial policies to promote such sectors can increase it.[18] Although this idea is consistent with the definition of strategic activities in the new trade theory literature, it has not been given adequate attention in that literature. Equally, although this idea is central to many discussions of competitiveness difficulties in the United States, it has not been subjected to adequate empirical analysis in the industrial policy literature.

Finally, on the issue of U.S. competitiveness, it is true that contributors to the industrial policy literature tend to focus on the deterioration in the relative position of the United States, rather than on the strength of its absolute position in output, productivity, trade shares, and other indicators of economic performance. It is also true, as a consequence, that the industrial policy literature tends to be nationalistic in tone, focusing on issues of relative national welfare, rather than on issues of aggregate welfare, independent of how it is distributed among countries. This is another reason why industrial policy analysis has attracted attention among U.S. national policy and business circles. As most academics must realize from their own personal experience, the tendency to determine how well one is doing by comparison to others is widespread. Actual or potential deterioration in one's relative standing suggests that something might be amiss, that one might be doing better even if the absolute level of success is high. This seems like a reasonable perspective from which to assess national economic policy and to determine room for improvement.

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[17] Fully 75 percent of the new jobs gained since 1979 were in retail and business/health services, both of which pay substantially below the average manufacturing wage and the average wage for the entire economy. This evidence is reported in "Family Income in Trouble," Briefing Paper, Economy Policy Institute, Washington, D.C., October 1986.

[18] For a theoretical demonstration of this point, see Jeremy Bulow and Lawrence Summers, "A Theory of Dual Labor Markets with Application to Industrial Policy, Discrimination and Keynesian Unemployment," NBER Working Paper no. 1666 (Cambridge, Mass.: National Bureau of Economic Research, July 1985).

The focus on national economic performance also means that indicators of national economic competitiveness, rather than indicators of the competitiveness of individual firms whose headquarters are in one country but whose production and distribution facilities are dispersed internationally, are the relevant subject of analysis in much of the industrial policy literature. Thus, the recent finding of Kravis and Lipsey[19] that exports of U.S. multinationals from offshore facilities did not lose world market share in the 1960s and 1970s while total exports from the United States did is interpreted as evidence of a national competitiveness problem in the sense that the United States became a less competitive site for the production and export of tradable goods.

The Implications of the Technology Revolution for Trade Theory and Policy

Ongoing BRIE research on new, computer-aided production and telecommunications technologies in a variety of sectors in both the United States and elsewhere in the world indicates that these technologies will have a revolutionary impact on patterns of international competition, with implications for trade theory and policy. The new technologies provide the foundation for greater global interdependence. In telecommunications, they underlie the increasing integration of world capital markets that has weakened the links between trade flows and exchange rates. In both production and telecommunications, the new technologies permit much greater decentralization of production and distribution facilities across national boundaries. The flexibilities of the new production

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[19] Irving Kravis and Richard Lipsey, "The Competitive Position of U.S. Manufacturing Firms", *Banca Nazionale del Lavoro Quarterly Review*, June 1985, pp. 127–154.

technologies[20] reduce the costs of product variety, thereby permitting profitable product differentiation for national, regional, and even local tastes. As a result, firms are better able to produce for a variety of different markets around the world, and nonprice competition based on product differentiation is likely to increase in importance. The new telecommunications technologies, which can provide up-to-date information on inventory, sales, and demand trends in different markets around the world, are a necessary component of production and sales strategies based on product differentiation for local markets. Globally, the results are likely to be an increase in trade flows, as greater product variety becomes an even larger impetus to trade, and greater market segmentation in Brander's sense that firms make distinct output and price decisions for different markets around the world.

The new technologies have implications not only for the output and marketing strategies firms choose but also for their decisions about where to locate production facilities. Jobs that previously had to be located close to one another can now be scattered widely throughout the world. Thus, the new technologies have hastened both the automation of labor-intensive jobs within the industrial countries and the migration of many low-wage, low-skilled jobs from these countries to the developing world.

In the new technological environment, the production location decisions of large multinational companies that account for a large share of world trade flows are increasingly driven by considerations of labor costs and government policies in different countries. From a national perspective, with physical capital and the technology embodied in it more mobile across national boundaries, competitiveness in world markets depends increasingly on the price, productivity, and skills of labor and on government policies that affect the relative attractiveness of locating production facilities in a particular country. In this global environment, the scope for potential conflicts between the profit objectives of multinational companies and the production, employment, and trade objectives of national governments becomes even greater than it has been in the past.

The greater international mobility of capital and technology and the decentralization of production it entails require a rethinking of the forces underlying national trading patterns. In a world where labor is the only immobile factor of production, standard theories of comparative advantage are not relevant. In a world where the newest process or product technology diffuses rapidly across national borders, often as a result of the global production strategies of multinational firms, the standard product-cycle theory of trade must also be re-examined. In such a world, the ability of an innovator to capture the returns to a new product or process depends not simply on being the first to market but on remaining competitive in international markets as the innovation diffuses to other producers and locations throughout the world. At a national level, the implication of these trends is clear: maintaining or strengthening a competitive advantage based on technological innovation will be an insufficient foundation for continued growth in national income and for maintaining an external trade balance. Without a "complementary" competitive advantage in related manufacturing capabilities, innovating countries stand to lose a large share of the commercial returns to their research efforts to other countries with superior manufacturing performance.[21]

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[20] Two kinds of flexibilities are involved in the new production technologies: static flexibility — that is, a single arrangement of equipment producing a wide variety of products; and dynamic flexibility — that is, a rapid change of production without expensive retooling.

In conclusion, let me note that, to date, neither the industrial policy literature nor the new trade theory literature has focused much attention on the implications of the new technologies for trade theory and trade policy. Yet, just as these technologies are slowly but surely revolutionizing the output, marketing, production, and location strategies of firms, so they will change the way contributors to both schools think about trade issues in the future. In my opinion, the most fruitful directions for research are those that focus on the effects of the new technologies on competitive dynamics in individual sectors or markets and on the determinants of national comparative advantage.

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[21] Teece, "Capturing Value from Technological Innovation."

Brander's 'Shaping Comparative Advantage': Remarks

John Whalley

In his paper, Jim Brander lays out very clearly the major themes in recent literature on the interlinkage between trade policy, industrial policy, and economic performance. In so doing, he has rendered all those engaged in trade policy debates a great service, especially in making more transparent recent contributions on links between market structure and trade policy.

In dealing with industrial policy, Brander also implicitly addresses the central issue that has preoccupied trade policy for more than 150 years: whether a policy of free trade or one of intervention, either through protection or export promotion, makes the most sense. For many years, economists have been world renowned for preaching the virtues of free trade, drawing on the well-known theorems that stress the gains from trade. In older analytic literature, there are deviations from a free trade stance, focused on the possibilities of gains from protection. These have included arguments for an optimal tariff based on a positive terms-of-trade effect associated with protection, and those involving infant industries, national security objectives, or short-term adjustment costs of the removal of tariffs. In the industrial organization literature of the past ten years, however, an alternative avenue of investigation has developed — namely, that a positive export promotion policy makes sense, reflecting the theme that interventionist promotional schemes may be desirable.

Brander lays out the main threads in this recent literature very successfully. Hence, my remarks concentrate on material that is complementary to Brander's. First, I clarify my understanding of the term "industrial policy", focusing on what I understand the rationale for an industrial policy actually to be. Second, I look at the main arguments that economists seem to accept when they come down against industrial policy, as so many seem to. These arguments focus as much on the practicalities of implementation as they do on the underlying analytical issues that Brander stresses. Finally, I try to elaborate why, at the same time that so many economists are skeptical of an interventionist industrial policy, there seems so much more support outside the economics fraternity.

What Is Industrial Policy?

Let me begin with the term "industrial policy", since, while widely used, it is one whose meaning remains somewhat ambiguous.

Industrial policy implies an active interventionist stance by government seeking to promote particular industries in some way. This may be either to stimulate production and increase the industry's size or to promote its export sales through explicit export subsidies.

The difficulty with such an explanation of the term is that, almost inevitably, all policies pursued by government have an industrial policy component to them, and many such policies are not deliberate industrial policies. In the trade policy literature, there is often a tendency to equate industrial policy with export promotion, which can include export subsidies. There is, however, a much wider range of policies that have this industrial component to them. In taxing or subsidizing particular industries and products, for instance, the tax system clearly has a major industrial component to it. Also, regulatory policy, minimum wage policies, and all of the direct and indirect interventions by government have industrial policy components associated with them.

There is also a tendency to think of industrial policy as being synonymous with the promotion of particular types of manufacturing industry, often of the high-tech variety. But there is no reason why industrial policy should be so narrowly defined. The European Economic Community's Common Agricultural Policy, for instance, can be labeled very clearly as an industrial policy. Indeed, some economists in developing countries have characterized it as the strongest import substitution policy currently practiced in the modern industrialized world.

Industrial policy, therefore, is a term that needs to be carefully defined in debates on industrial policy and trade performance. An example of how broad the concept can be is contained in a recent monograph by Rick Harris, mentioned in Brander's paper.[1] Harris reviews much of the same trade policy literature that Brander summarizes, and in the last chapter deals centrally with industrial policy questions. Harris discusses a Canadian industrial strategy comprising three components. The first is free trade with the United States. The second is a policy of facilitating adjustment of workers between firms through adjustment assistance. The third is the more usual concept of an export promotion policy for particular industries. Yet, to most users of the term, free trade is a trade policy, not an industrial policy, and adjustment assistance usually is construed as adjustment policy, not industrial policy.

Thus, industrial policy may be used in a broad-ranging way to denote any form of interventionist policy by government or, in a much narrower and more focused way, to indicate selecting particular industries for government to promote, and by the use of particular instruments.

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[1] Richard Harris, *Trade, Industrial Policy and International Competition*, Collected Research Studies of the Royal Commission on the Economic Union and Development Prospects for Canada, no. 13 (Toronto: University of Toronto Press, 1985).

The Rationale for an Industrial Policy

Whatever the term's ambiguities, there is no doubt that there is substantial current debate on the rationale for industrial policy. I think it is worth clarifying some of the basic issues. Industrial policy and the rationale for industrial policy often are equated, not only with the market structure issues Brander stresses but also with the presence of scale economies and external effects between firms. One has to be very careful, however, in clarifying exactly to which rationale one is appealing.

In the case of scale economies and externalities, even though the theories of equilibrium behavior in their presence — particularly of scale economies — are far from complete, there seems to be nothing in the literature that suggests a direct rationale for an industrial policy *per se*. The presence of scale economies alone does not preclude the possibility of firms wishing to exploit scale economies from borrowing sufficient funds to move to minimum efficient scale. Only when there is some market failure, whether in financial markets or of an informational nature, is there a clear rationale for government intervention. Indeed, in such cases, the rationale for intervention may not be in the form of conventional industrial policy but may call instead for dealing more directly with any market failures identified.

In the case of market-structure issues, however, the rationale for industrial policies becomes clearer. As Brander emphasizes, this has been the thrust of recent industrial organization and trade literature. One of the central pieces in this area is a joint paper by Brander and Spencer,[2] which looks at a situation where oligopolists in two countries each adopt Cournot quantity-setting behavior. Brander and Spencer show that in such a situation, a policy of export subsidies, openly declared by one of the governments, can improve national welfare by shifting the profit function of the domestic firm and forcing the rival oligopolist in the neighboring country down its reaction function. In this case, a clear rationale for an interventionist industrial policy exists as a national strategic improvement.

While my knowledge of this literature is shallow compared with Brander's, my impression is that results such as this, while being of great analytic interest, are somewhat brittle, and subsequent industrial organization literature has emphasized how analytic arguments in favor of an interventionist industrial policy are special cases. For instance, Eaton and Grossman[3] show how the Brander-Spencer model, when changed from

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[2] James A. Brander and Barbara J. Spencer, "Tariffs and the Extraction of Foreign Monopoly Rents under Potential Entry," *Canadian Journal of Economics* 14 (1981): 371–389.

[3] Jonathan Eaton and Gene Grossman, "Optimal Trade and Industrial Policy under Oligopoly," *Quarterly Journal of Economics* 101 (1986): 363–406.

Cournot quantity-setting behavior to Bertrand price-setting behavior, results not in an argument for export subsidies but in one for export restrictions through quantity restraints on exports. Thus, even though a rationale for an industrial policy is present in recent market structure trade literature, one cannot claim that such a rationale is widely supported by a whole class of models whose results are generally viewed as robust.

Equally, much of this literature takes the particular market structure environment as given, and does not assess the desirability of antitrust policy as against an interventionist policy in the form of industrial targeting, which takes the market structure as given. For instance, if an oligopoly situation occurs because of entry restrictions, it may well be that a vigorous antitrust policy may improve national welfare more than would export promotion policies.

Thus, the conclusion I draw from recent literature is that, while there is clearly an analytic rationale for an interventionist industrial policy, the results that support this rationale are not as widely applicable as one might have thought.

Implementing an Industrial Policy

Besides debating the rationale for industrial policy on purely analytic grounds, my sense is that one also has to focus on the difficulties of implementing an industrial policy. It is here that I believe the debate on industrial policy is a little weak.

Put simply, the issue is: How does one pick winners? The informational requirements for government agencies to select accurately and adequately which industries to promote are clearly intimidating, and the theoretical literature on industrial policy has yet to focus on this. Examples of industrial policy attempts, particularly in Europe, show clearly how governments are equally capable of selecting spectacular losers as they are of picking winners.

The need to target involves not just selecting broad sectors but very specific products. For instance, in recent meetings and conferences, I have heard remarks by government officials that indicate that Canada is viewed as internationally competitive in office furniture, whereas in home furnishings, the situation is quite different. Canada also seems to be becoming internationally competitive in seedless cucumbers. The sense one has is that targeting broad sectors is not sufficient; very narrowly defined product selection is involved.

Moreover, one's sense is that what one official feels may be an emerging area of international competitiveness, another feels is not so promising. And the same person in discussions a few months later may give a quite different picture. Many government officials I have talked to seem openly skeptical of their or, indeed, anyone's ability to pick winners. When one keeps in mind that in the Soviet Union, during the process of setting quantity targets, 20 million items are eventually planned, the level of detail involved rapidly becomes intimidating. Indeed, it is on this practical issue of implementing an industrial policy, more than on analytic grounds, that so many academic economists seem skeptical. And this seems largely based on their gut reactions to the ability of government agencies to select those industries that are to be the beneficiaries of industrial promotion.

Industrial Policy and Trade Retaliation

Beyond actually picking winners, another issue is that of trade retaliation. In much of the industrial policy debate in Canada, the issue of trade retaliation by major trading partners is often ignored or assumed away. And yet, this trade retaliation problem is at the heart of the current debate on Canadian-U.S. free trade.

Canada views itself as being one of the losers from U.S. contingent-protection policies pursued under countervail, safeguards, and antidumping, with countervailing duties being perhaps the central issue. The difficulty in using an industrial policy in a country such as Canada is not only in adequately developing the rationale for such a policy but also in dealing with triggered trade retaliation by major trading partners. Put simply, how can an industrial policy be designed that is fully out of the reach of U.S. countervail? In trying to negotiate a trade arrangement with the United States, Canada will be trying, in part, to do precisely that. But equally, the U.S. negotiating position almost certainly will be not to relinquish countervail fully. And while the subsidies code is designed to restrict only export subsidies and leave in place those subsidies that are generally available to all producers within a country, the code's ambiguities and vagueness still leave the possibility for harassment of domestic firms by foreign firms filing countervail petitions, since cases exist where such petitions have been successful. Furthermore, retaliation can take place through safeguard actions, as has happened in a number of product areas in recent years.

Thus, a further issue complicating the implementation of an industrial policy for smaller open economies is that such a policy, which may have a rationale in the absence of retaliation by trading partners, may indeed trigger retaliation and, in the final analysis, may be counterproductive.

Why Are Economists Skeptical and Others Supportive?

While these may be the main issues in terms of the rationale for an industrial policy and the practicalities of implementing it, it is perhaps still worth discussing why recent debates on industrial policy have taken the twists that they have. It seems that the majority of academic economists remain fundamentally skeptical of industrial policy, whereas outside the academic community (and in some countries, in particular), there is continuing support for an interventionist-type approach. Why is this the case?

Among academic economists, first of all, there is a gut reaction in favor of free trade, based on the following line of argument. Economists are used to developing theoretical lines of reasoning, within which there are always special cases that allow for the opposite conclusion to what is viewed as conventional wisdom. In fact, a major preoccupation of economists is constructing theoretical propositions that run counter to what is viewed as received wisdom, in part to probe the robustness of their basic theoretical frameworks.

In the trade area, the underlying theoretical rationale for free trade is based on the classical Ricardian notion of comparative advantage. Over the years, a number of theoretical propositions have evolved — such as infant-industry arguments, optimal tariffs, market-structure issues, and the like — that reverse the standard argument. Most economists, however, want to classify these as theoretical "curiosums" relative to the mainstream view. While this may have changed somewhat during the past ten years with the increasing focus on market-structure issues in trade theory, the sense I have is that most economists still instinctively react in favor of a free trade approach, and tend to discount deviations from a traditionalist free trade way of thinking.

Most economists also remain fundamentally skeptical of the ability of government agencies to pick winners, as noted above. Suspicion and skepticism of government runs deep in the current academic community, and failures such as the Concorde simply confirm their doubts. Talk of industrial policy, therefore, sends shudders down many academic spines. In turn, public-choice economists often argue that industrial policy advocacy is part of the process of creating government agencies, which seek to acquire centralizing powers in order to develop.

But if this is the economists' view, why is it that there seems to be so much more support for industrial policy outside the economics fraternity? The first, and perhaps most important, reason is the common perception that the strong, postwar Japanese growth performance has been based on Japanese government intervention and its ability to pick winners, a point that Brander raises in the introduction to his paper. Growth performance in Japan in the postwar years clearly has been spectacular, with real average growth around 8 percent between 1947 and the early 1980s (although it is now slowing quite markedly). Hence, there is a desire to emulate Japan; the Japanese route (industrial policy) is viewed as the one to follow.

On this point, it is worth noting two things. First, a consensus view has not yet developed on the explanation for this strong Japanese growth performance. There are many conflicting views in the academic community, and they focus not just on Japanese government policies that promote particular industries and firms but also on wider features of the Japanese economic structure. As Brander mentions, some view the high savings rate in Japan as central, which, in turn, is driven in part by the Japanese tax system. Be that as it may, in the public consciousness, Japanese success, and the desire to emulate Japan, provides a strong rationale in favor of an industrial policy.

In addition to support on the basis of Japanese growth performance, there is also support based on the attractions of both action and novelty as a way of dealing with perceived problems. Trade deficits, lagging productivity, and other ills demand action. Interventionism and activist policy often have a ring of plausibility, because there is the appearance of action in response to a perceived problem. For academic economists to say the best prescription is to do nothing and to allow the interplay of market forces to work their way through is often quickly dismissed as a pessimistic, nihilistic approach that does not respond adequately to the imperative of the problems of the day. A favorite theme of economists, at least in private conversation, is to portray their subject as a science that does not come up with new conclusions but merely repeatedly reemphasizes the essential truths in a world where, as Brander suggests, nonrigorous thinking abounds. Something of a schism remains, therefore, between the academic community and important sections of the wider policy community on this issue.

The Bottom Line

The bottom line is that, yes, there are theoretical rationales in favor of an interventionist industrial policy but, from my limited reading, these theoretical rationales are brittle and may well be special cases. There also seems to be no firmly based operational support for an industrial policy, in the sense of cases that show clearly and unambiguously both that it can be done and how it can be done. This is not to say that governments should not pursue an industrial policy. It is just that, from the point of view of empirical support based on operational case studies, how governments should go about it is not obvious. Indeed, in evaluating directions for future research work in this area, my opinion is that the need for empirical, rather than theoretical, work is paramount.

Beyond this, there are questions of the practicalities of implementing an industrial policy. Like many other academic economists, I continue to question fundamentally the ability of government agencies to pick winners successfully, and to my mind this remains one of the key and central issues in the industrial policy debate.

'Strategic' Trade Policy: Research and Practice in the United States

J. David Richardson

Opinion in the United States seems split these days on whether traditional U.S. trade policy is bankrupt or needs adherence "now more than ever". At the same time as the U.S. government wheedles its way toward a new round of multilateral negotiations under the General Agreement on Tariffs and Trade (GATT), it cajoles Japan into policing "orderly" trade in automobiles and semiconductors, leans on suppliers of steel and machine tools to restrain exports to the United States, shoots export subsidies across the bow of European agricultural freighters, and embraces bilateral free trade areas with Israel and, perhaps, Canada. How much of this is trade policy as usually practiced in the United States, and how much is new? What motivates the "new"? How much of the "new" is wise and how much is foolish?

Recent research on trade policy in strategic environments provides a start at answering these questions. My summary of the answers provided is that a significant number of current U.S. trade initiatives spring from a new perspective on international markets, but that only a subset of them are in the broad interest of the United States.

Gaining Perspective

Comparative Advantage and Industrial Structure

It is folly to think that certain "old fundamentals" of international trade analysis are dead. They are indeed older. There are indeed "new fundamentals" around. Some of these are adolescents, and some infants (a few are stillborn). But the patriarch fundamentals persist, and wield surprising power. Thus, to pick an easy, yet representative, mark and with due confession that economists engage in silly sloganeering on these matters, too, it is hyperbole to say that "the theory of free trade is rooted in a world that no longer exists."[1] Properly understood, the patriarchal theory of "free" trade recommends no more freedom for international trade than for domestic exchange, but no less either. Free trade is a principle of nondiscrimination between domestic and foreign commerce. Furthermore, it is rooted in *reality* — precisely the same reality that causes us all as individuals to specialize in some career and to use our income freely to exchange goods and services with other individuals. Is career training and consumer choice "rooted in a world that no longer exists"? Hardly. Neither is the theory of free trade. You and I as individuals do not restrict our sales and purchases to only a few neighbors whose ethnic background, lifestyles, and values are comparable to ours. Neither do countries.

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[1] Henry A. Kissinger, "Saving the World Economy," *Newsweek*, January 24, 1983, p. 46.

There are other "old fundamental" views, of course. One is sometimes thought to oppose what has just been written — in fact it does not; the opposition is false. This is the view that governments should care about the industry mix of their comparative advantage, just as an individual should care about noneconomic aspects of his or her career choice. No one seems to object when an individual whose skills are ideally suited for some high-paying profession chooses a lower-income career in order to be more secure, independent, relaxed, directive, and so on. Even very conservative economists seem to be content to allow individuals freely to overrule income maximization based on personal comparative advantage. It is curious, then, that there are objections if representative governments overrule national comparative advantage and choose some industry mix that, admittedly, reduces national income but that enhances, for example, national security, independence, and control. It is even more curious that economists object in principle to industrial and trade policies that aim to increase national income itself. In practice, such policies may not work. But in principle, it makes sense for every government to prefer an industrial mix that increases national market power. Individuals prefer careers with market power. Governments should, too. The problem for both is how to satisfy their preference practically.

The economist's traditional resolution of this problem is to leave trade "free", in the sense of not discriminating between foreign and domestic commerce, and to assign the task of influencing the industry mix to production taxes and subsidies "in a first best way". (For some reason, trade economists never call this industrial policy, although it is.) This traditional resolution, which involves pairing off policies with problems over which they have the most direct influence, has much to recommend it in a perfectly competitive environment. Most important, this resolution wastes fewer resources than almost any array of tariffs, export promotion, or other types of trade policy intervention.

"Strategic" and Perfectly Competitive Environments

The recent world trading environment seems better characterized as "strategic"[2] than as perfectly competitive. A new economic analysis of industrial and trade policy in strategic environments has arisen that is quite different from its counterpart for perfectly competitive environments.

Strategic environments are those in which the number of economic agents making interdependent decisions is relatively small. Each agent takes into account some counterresponse from rivals in calculating its best course of action. Actions include threats and promises, bluster and bluff, collaboration and commitment, all aimed at influencing the outcome of an endeavor in one's own favor. These are familiar features of games and war. They have little place in the perfectly competitive environment traditionally employed to analyze trade policy.

In the perfectly competitive environment, each of many agents considers itself too small to influence market outcomes and, therefore, too small to be noticed. Each, therefore, makes choices assuming that all rivals' variables are given. Governments in this familiar framework presume that their policies affect market equilibrium, but do not account for the way that they may affect the behavior of other governments. When agents take their rivals' actions to be immutable, strategic behavior plays no role, and there are only weak analytical defenses for trade policy intervention.

Such need not be the case in strategic environments. There, trade policy can alter the entire set of preconditions on which large agents and governments base their own strategic decisions. One can illustrate this potential symbolically in a strategic environment described by:

(1s) $D_i = D_i\,(P\,,\ D_j,\ Z)$ for all i and j,
(2s) $P_k = P_k\,(P_l,\ D\,,\ Z)$ for all k and l,
(3s) $Z\ = Z\ (P\,,\ D\,,\quad)$.

Its contrast to the most familiar competitive environment is then straightforward:

(1c) $D_i = D_i\,(P\,,\quad ,\ Z)$ for all i,
(2c) $P_k = P_k\,(\ \ ,\quad ,\ Z)$ for all k,
(3c) $Z\ = Z\ (P\,,\ D\,,\quad)$;

where

D is a vector of *D*ecisions by agents i and j, D_i and D_j denoting the decisions of each;

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[2] The meaning given below to this word is narrower and more precise than in most recent research and commentary, where "strategic" often means simply "important" or "important for reasons not adequately reflected in market valuation."

> P is a vector of *P*olicies by governments k and *l*, P_k and P_l denoting the policies of each;
>
> Z is a vector of market and institutional variables, including, for example, the sum of all firms' D's on production, called "industry production".

The competitive environment (1c) – (3c) is seen to be just a special case of the strategic environment (1s) – (3s), simpler because certain influences are ignored, and analytically more tractable. The usual justification for ignoring the influence of D_j on D_i is that there are large numbers of i's and j's, each of whose influence on others is small enough to neglect. One could make a similar appeal to justify ignoring the influence of P_l on P_k; and the influence of D on P_k is usually set to zero on the grounds that representative government is (an exogenous) "first mover" in setting its policy, and not responsive to individual agents' decisions (elements of D, or "special interests") except as they are reflected in overall votes or market trends (Z).[3]

Trade issues increasingly arise in environments that seem strategic and that do not fit the orthodox competitive paradigm. Firms have grown multinationally over the past few decades. The European Community, communications innovation, capital-market integration, and ambitious development plans all have encouraged coproduction, joint ventures, mergers, and global identity. In some national markets, a small number of firms compete for a "prize" that is essentially control of the whole country's industry. The growth of trade has been more rapid in industries with concentrated market structure than in those with competitive structure. For example, trade in aircraft, electronic machinery, chemicals, and petrochemicals grew much faster between 1973 and 1983 than trade in wood, paper, and foods.[4]

In such concentrated environments, firms clearly recognize the effect that their actions have on the behavior of other firms, and sometimes of governments. Governments have turned to firm-focused performance requirements, for which firm-focused favors, such as tax incentives, are returned. Each firm or government conjectures how rivals and other agents will react to its own decisions. Furthermore, governments strategically "game" among themselves. Their choices regarding trade policy induce either retaliation or cooperation from rival governments, as illustrated by the growth of discriminatory free trade arrangements and trade barriers and by the growing insistence on demonstrations of bilateral reciprocity. Governments, furthermore, are sometimes the owners and indirect managers of firms.

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[3] One can also readily see how these competitive and other assumptions are "strategic" abstractions (to use the word in a different sense) meant to simplify analysis, as all theory must do, but capable of empirical refutation. It seems fair to say further that the behavioral linkages that are ignored in the competitive environment — D_j to D_i, P_l to P_k, D to P_k — are precisely those linkages that practical men and women describe as "power" and "influence". Little wonder, then, that there seems to be little communication between those people and traditional economists. One can also see how still other environments might be defined — for example, a "hegemonic environment" made up of one large strategic agent acting according to (1s) – (3s), and many small competitive agents acting according to (1c) – (3c).

[4] General Agreement on Tariffs and Trade, ***International Trade 1984/85*** (Geneva, 1985), p. 17.

"Strategic trade policy" is the name used here for trade policy in strategic environments. It is both topical and controversial. It is topical in the United States because of the perception that governments abroad are taking unfair advantage of the United States' commitment to open trade. This perception underlies sentiment for new and aggressive "reciprocity" requirements in U.S. trade policy. It is also topical because strategic moves by foreign firms, often with support of their governments, seem to some observers to be placing U.S. firms under unprecedented competitive pressure. This pressure lies behind many of the recent demands for U.S. industrial planning, to prevent U.S. sectoral structure from becoming the castaway residual from world sectoral planning. It is topical in the rest of the world, therefore, because its ability to achieve industrial planning goals may be vitiated by strategic activism in the United States.

International Competitiveness

Some commentators measure international competitive pressure on the United States by the massive size of the U.S. trade deficit, or by the historically high, price-adjusted value of the U.S. dollar (the "real exchange rate"). These are, indeed, helpful measures for evaluating macroeconomic and other policies that affect saving, investment, and international capital movements. They are not helpful measures for evaluating trade and industrial policies, which, under most definitions, have their largest effects on the volume and structure, but not on the balance, of merchandise exports and imports nor on real exchange rates or international capital movements.[5]

A better measure of international competitive pressure for evaluating trade and industrial policies is "profit", without yet being too precise in defining this term. That is what a multidivisional firm would use to measure its own competitive pressure, and to assess its own "policies" toward suppliers and customers (its trade policies) and toward one of its divisions over another (its industrial policies).

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[5] Rachel McCulloch and J. David Richardson, "U.S. Trade and the Dollar: Evaluating Current Policy Options," in Robert E. Baldwin and J. David Richardson, eds., *Current U.S. Policy: Analysis, Agenda, and Administration* (Cambridge, Mass.: National Bureau of Economic Research, 1986), pp. 49–75.

From this perspective, a country is just like a multidivisional firm. Unprecedented international competitive pressure might be reflected in lower national "profits" relative to those abroad — I include in national profits the reward for a country's unique and superior technology, management, and so on. In this conception, unprecedented international competitive pressure might be reflected as readily in lower national wages relative to those abroad. This would happen to the extent that a country's workers are able to "tap" its profits, translating them into income and favorable working conditions (safety, leisure) — perhaps because migration barriers isolate them from direct competition, because workers' unions are themselves large, strategically minded agents, and/or because a national government acts in part as an agent on behalf of its worker-voters.

From this perspective, it is also easy to understand concern over the industrial source of international competitive pressure, not just its overall intensity. For the same given overall intensity of international competition, measured by the trade balance or real exchange rate, national profits would be smallest if the pressure were most severe in the highest-profit industries — for example, those with historically strong market positions or technological leadership and dynamism.

Indeed, "profit" that exceeds the perfectly competitive (normal) level is the key additional variable in strategic environments, whether it is shared with workers or not. Policy toward such supernormal profit cannot even be defined in a competitive environment. Trade policy plays an important role because a country's supernormal profit can be increased by charging higher prices to *foreign* buyers and/or by offering lower reward to *foreign* suppliers. That supernormal profit can be protected from foreign predation by policy that deters identical actions abroad.

Trade policy aimed at such international profit shifting, whether capture or preservation, is not, of course, all that matters. Policy toward investment, education, technology, and risk taking probably matters more, because it creates the shiftable supernormal profits in the first place. Policy attention should not become diverted from profit creation by excessive concern over profit shifting. Yet, to ignore profit shifting completely seems quite risky. There are, after all, two ways to win a race. One is to pay no attention to your rival and concentrate on racing as fast as possible. This is likely to improve the times of both racers — as long as your unprovocable passivity does not tempt your rival to trip you up in some sinister way. The other way is to watch your rival attentively and, if not necessarily throw obstacles in his path, at least be alert to avoid those he throws in your path. This may slow down the time of both racers but not inevitably if, for example, it deters your rival from inimical behavior. The metaphoric lesson is that national policies toward profit creation are probably the most important concern, but policies toward profit shifting are an important ancillary concern.

Perspective on Research and Practice in the United States

Obviously, strategic trade and industrial policy is controversial. Critics doubt its empirical relevance. They worry that mere discussion of strategic policy will lead to mutually destructive trade wars, or to acceleration of unproductive windfall seeking by special-interest groups. They worry that strategic policy requires calculations and thrusts that government may be ill-equipped and ill-advised to carry out, especially in the United States.

This part of the paper briefly describes U.S. research in strategic trade and industrial policy, and its practical implications in light of U.S. political traditions and institutions.

One strand in the analysis of strategic trade policy has a long history: strategic sensitivity among governments to the retaliation and liberalizing initiatives of other governments. This sensitivity could be modeled without abandoning the convenient competitive assumptions for private economic agents. Hence, it was an obvious place to start. Much more recent is the analysis of trade policy with strategically interdependent firms. And still to be explored analytically is the strategic interplay of trade policy authorities and large economic agents (firms and unions).[6] Many of the insights from the early analysis help to inform the more recent analysis, which naturally adds its own unique insights.

Strategic Trade Policy among Governments

Static Analysis

The classic analysis of strategic trade policy as a reactive "game" between governments is Johnson's study of the optimum (monopoly) tariff in the presence of retaliation.[7] One problem with the equilibrium in this analysis is that it is quite possible for each country to be worse off than if each would foreswear the use of trade policy entirely.[8] This unfortunate property of a noncooperative conflict is known as the "prisoner's dilemma". Each government would agree to an alternative outcome (free trade) if only there were a way that the other could make credible a promise not to cheat. Yarbrough and Yarbrough[9] examine the way hegemony and direct foreign investment make such promises credible. This is also a role that a forum for cooperation such as the GATT might play.[10] Yet, GATT cooperation in practice may not guarantee desirable results. Baldwin and Clarke,[11] for example, find that Nash *non*cooperative solutions to conflict over alternative Tokyo Round tariff-cutting formuli seemed superior for all protagonists to the compromise formula that actually emerged "cooperatively". Caplin and Krishna[12] currently are working on the strategic merits of Most-Favored-Nation (MFN) rules in the GATT, and Avinash Dixit is evaluating strategic opportunities for the trade policy of small countries.

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[6] There has been, however, considerable empirical work on the half of this interaction that measures policy sensitivity to large agents. A good summary is Robert R. Baldwin, *The Political Economy of U.S. Import Policy* (Cambridge, Mass.: MIT Press, 1984). There is also, of course, the extensive literature analyzing the strategic interaction between policy authorities and coalitions of constituents, such as large lobbies. Analysis is also beginning of strategic government-firm interaction using modern techniques (see Richard Jensen and Marie Thursby, "A Strategic Approach to the Product Life Cycle," *Journal of International Economics* [forthcoming]; and Motoshige Itoh, Tetsushi Honda, and Kazuharu Kiyono, "Policy Formation and Response: The Case of Trade Studies" [University of Tokyo, 1986, Mimeographed]).

[7] Harry G. Johnson, "Optimum Tariffs and Retaliation," *Review of Economic Studies* 21 (1954): 142–153.

Dynamic Analysis

More realistically, governments recognize that setting trade policy is a "repeated game", involving ***sequences*** of equilibria. They might adopt more sophisticated strategies, such as "follow free trade unless and until the foreign government deviates, then respond in kind for one, two, or more periods." One of the more provocative conclusions of nascent dynamic analysis[13] is that if each government believes there is some probability that its rival would foreswear its optimal plan and simply be "a nice guy", or that the rival would be willing to try out a cooperative stance until and unless it was exploited, then free trade can prevail for some part of the repeated game. It is interesting that mere belief can bring about an outcome in which these beliefs are in fact validated by actions.[14]

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[8] See also Raymond Riezman, "Tariff Retaliation from a Strategic Viewpoint," *Southern Economic Journal* 48 (1982): 383–393.

[9] Beth V. Yarbrough and Robert M. Yarbrough, "Opportunism and Governance in International Trade: After Hegemony, What?" (Paper presented at National Bureau of Economic Research Conference on the Political Economy of Trade Policy, Dedham, Mass., January 1986).

[10] For an analysis of the incentives for negotiated cooperation in such a forum, see Wolfgang Mayer, "Theoretical Considerations on Negotiated Tariff Settlements," *Oxford Economic Papers* 33 (1981): 135–153.

[11] Robert E. Baldwin and Richard N. Clarke, "Game Modelling the Tokyo Round of Tariff Negotiations," NBER Working Paper no. 1588 (New York: National Bureau of Economic Research, March 1985).

[12] Andrew Caplin and Kala Krishna, "MFN and Tariffs: A Game Theoretic Approach," (in process).

[13] For example, Richard Jensen and Marie Thursby, "Free Trade: Two Non-cooperative Equilibrium Approaches" (Ohio State University, 1983, Mimeographed).

The Key Point and Its Political Importance[15]

The most fundamental implication of all this analysis is that a country's ideal trade policies in a strategic environment are active, not passive. Active policies include *reaction* as well as initiation.[16] Policy passivists sometimes recognize this but argue that the complexity and unpredictability of strategic trade policy are overwhelming defects. Strategic trade policy, however, need not be complex or unpredictable. In fact, if Axelrod's work[17] is any guide, it better not be! Simple and transparent rules are often excellent strategies. And strategic trade policy need not be aggressive or exploitative. Defensive, beggar-avoidance policies deter beggar-your-neighbor policies abroad by responding when provoked. This is active dissuasion, to be contrasted with active aggression: beggar-your-neighbor policies that look for chances to exploit by initiating cheating. Defensive policies are reactively active.

There is, furthermore, a *political* problem with passive trade policy. Policy that is invariant to time or circumstance is equivalent to allowing some other government to set trade policy for ours. Given the choice between our actively determining our own policy and someone else doing it, only foolish or incompetent governments should choose passive trade policy.

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[14] Similar conclusions have been drawn by political scientist Robert Axelrod (*The Evolution of Cooperation* [New York: Basic Books, 1983]). His research was not applied initially to strategic trade policy, but has suggestive implications for any recurring prisoner's dilemma. These implications have been discussed subsequently by Robert Axelrod and Robert Keohane, "Achieving Cooperation under Anarchy: Strategies and Institutions," *World Politics* (1985); Judith L. Goldstein and Stephen D. Krasner, "Unfair Trade Practices: The Case for a Differential Response," *American Economic Review* 74 (1984): 282–287; James A. Brander, "Rationales for Strategic Trade and Industrial Policy," in Paul R. Krugman, ed., *Strategic Trade Policy and the New International Economics* (Cambridge, Mass.: MIT Press, 1986), pp. 36–43; and J. David Richardson, "The New Political Economy of Trade Policy," in Krugman, *Strategic Trade Policy and the New International Economics*, pp. 270–274. Brander also discusses them in his contribution to this volume, and so they need not be summarized here.

[15] This section is an expansion of J. David Richardson, "International Trade Policies in a World of Industrial Change," in Federal Reserve Bank of Kansas City, *Industrial Change and Public Policy* (Kansas City, 1983), pp. 284–285.

[16] Policy in equation (2s) above is active, that in (2c) is passive. For active policies, initiation would be represented in (2s) by writing expected leading values of D, P, and Z on the right-hand side, reaction by writing lagged values of D, P, and Z on the right-hand side. The potential for active U.S. initiation exists in enabling legislation for GATT rounds and in Section 301 of the *Trade Act of 1974, while reactively active* provisions include Section 201 (escape-clause) remedies and countervailing and antidumping duties.

[17] Axelrod, *The Evolution of Cooperation*.

The point can be made in a more arresting way. Some economists defend passivity and foreswear active trade policy because active policy almost always "beggars our neighbor" — we improve some domestic situation by making the same situation worse in our trading partners. But in this light, passive trade policy is equivalent to allowing foreign governments to "beggar us" with impunity. It is almost as if our policy were to allow their policy to decide for us. That is not on the face of it a better course of action. And it is clearly worse when a government allows others to exploit its constituents by slavish allegiance to the status quo.

These considerations notwithstanding, some commentators continue to favor passive trade policy. Baldwin characterizes their view as follows:

> The fact that a foreign government's subsidy policies place severe competitive pressure on certain U.S. industries...is not in principle different from the fact that the existence of lower wages abroad puts severe competitive pressure on particular U.S. industries. If foreign governments want to use their own taxpayers' money to provide us with goods at lower prices than we can provide ourselves, then we should welcome the addition to our living standards.[18]

"Send them a note of thanks," as some wags put it, just as if they accepted lower wages or developed a new technology. The implication of this view is that foreign governments should be free to choose their own optimal pattern of industrial subsidies and that our policy response should be always passive. That stance abjures the strategic insight that ***our*** policy may be able to improve for us ***their*** calculation of optimal policy (whereas our policy is not likely to be able to influence their wages or technology). That is, we may be able to choose some active policy, or menu of active policies (contingent on foreign response), that would shift "optimal" foreign policy to an outcome more desirable to us than the outcome under policy passivity.[19]

Furthermore, active dissuasionary policy may even involve no resource cost, despite its "active" character. Countervailing and antidumping duties provide a potential example. If they were credibly anticipated by foreign suppliers and rescinded once subsidized exports and dumping ceased, then no subsidized exports or dumping would take place and no duties would be levied.[20] Trade would appear to be free and undistorted by subsidies, price discrimination, or duties. Yet, the appearance would be the result of active, not passive, trade policy. U.S. antidumping and countervailing-duty policy is meant to approach these features in principle, since it is designed to be transparent, nondiscretionary, and in force for only as long as injurious export subsidization and dumping continue. Practice may be otherwise, but that is not a flaw in the *analytical* case for these strategic trade policies. The antidumping provisions of the recent agreement between the Japanese and U.S. governments on semiconductors are also meant to remove a distortion rather than impose one, although in that case, there is reason to believe that what appeared to be "dumping" was simply optimal forward pricing of short-lived product lines with high fixed development costs.[21]

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[18] Robert R. Baldwin, "Protectionist Pressures in the United States," in Ryan C. Amacher, Gottfried Haberler, and Thomas O. Willett, eds., *Challenges to a Liberal Economic Order* (Washington, D.C.: American Enterprise Institute, 1979), p. 236.

[19] David R. Macdonald, "A Washington Perspective on Strategic Behavior and Trade Policy" (United States, Office of the U.S. Trade Representative, Washington, D.C., March 1983), pp. 13–15.

Strategic Trade and Industrial Policy toward Imperfectly Competitive Firms

Imperfectly Competitive Firms with Supernormal Profits

The analysis of strategic policy in imperfectly competitive markets, those with small numbers of firms, is less well developed than the analysis of strategic government-to-government response. The reason is that the characterization "imperfectly competitive" takes on many different meanings in many different contexts. The most important element of imperfect competition in early research, however, has been the ongoing or transitory supernormal profits discussed above and the implied potential for shifting them among countries.[22]

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[20] Barry Eichengreen, "The Simple Analytics of Dumping," Harvard Institute for Economic Research Discussion Paper no. 943, revised (Cambridge, Mass., March 1983), pp. 9–10.

[21] For a discussion of such goods, see Richard Baldwin and Paul R. Krugman, "Market Access and International Competition: A Simulation Study of 16K Random Access Memories," NBER Working Paper no. 1936 (Cambridge, Mass.: National Bureau of Economic Research, June 1986).

[22] James Brander and Barbara Spencer, for example, and Paul Krugman, in a series of papers discussed in Brander's contribution to this volume, generate a possibility for strategic trade and industrial policy that is aimed at capturing (or preserving) supernormal profits. This analysis, of course, has attracted important dissent and conditioning, most of which Brander discusses and which can be found in a number of survey papers, including Avinash K. Dixit, "International Trade Policy for Oligopolistic Industries," *Economic Journal* 94 (Supplement, 1984): 1–16; idem, "Strategic Aspects of Trade Policy," in Truman Bewley, ed., *Advances in Economic Theory* (Cambridge: Cambridge University Press, forthcoming); Gene M. Grossman and J. David Richardson, "Strategic Trade Policy: A Survey of Issues and Early Analysis," Special Papers in International Economics no. 15 (Princeton, N.J.: Princeton University, April 1985); Anthony J. Venables, "International Trade, Trade and Industrial Policy and Imperfect Competition," Centre for Economic Policy Research Discussion Paper no. 74 (London, October 1985); Krugman, ed., *Strategic Trade Policy*; and idem, "Industrial Organization and International Trade," NBER Working Paper no. 1957 (Cambridge, Mass.: National Bureau of Economic Research, June 1986). The reader is referred to these studies for additional detail.

One clarification is worth stress. The conclusions of the analysis appear to be neomercantilistic, since they rest on "improving the competitive position of our firms". This seems a far cry from the traditional, respectable, and even-handed trade policy objective of maximizing the standard of living of the whole country. In fact, though, under the imperfectly competitive conditions often assumed, attaining the neomercantilist objective is an important part of attaining the traditional national welfare objective. Global supernormal profits are taken as given. Countries compete over their international distribution. The larger the share that our policy can claim for us, the larger is our national purchasing power and economic welfare. Nor are we necessarily exploitative to want as large a share for ourselves as possible. That is simply the logical implication of caring about national welfare. And its defensive version is even more unobjectionable. We would not sensibly choose to encourage imperfect competitors abroad to collect supernormal profits from us.

Trade policy is arguably appropriate to attain these objectives. Industrial policy may be less appropriate, involving unwanted by-products. The reason is the transport costs and cultural differences that separate national markets. An optimal strategic policy is then made up of a *set* of initiatives, a different initiative for each segregated market, all aimed at capturing the maximal share of every national pool of supernormal profits. Trade policy that is not MFN is an effective instrument for such market-by-market profit preservation. Policies such as production subsidies and MFN taxes and tariffs often will be second best by comparison.

Imperfectly Competitive Firms with Subnormal Profits

There would seem to be a parallel policy analysis to that above for imperfectly competitive markets with small numbers of multiproduct firms making subnormal profits on certain products.[23] Such products presumably would be covering their variable costs (otherwise they would have been phased out immediately), but not necessarily their fixed costs, nor the cost of their contribution to the "common resources" of the firm,[24] nor any severance or shutdown costs. The best examples of these firms and products might be found in declining industries, such as basic steel in the industrial countries. These industries are also the ones people seem to have in mind when they speak of the problem of "structural adjustment".

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[23] Subnormal profits can be defined as any difference between a product's revenues and its costs that is insufficient to keep the firm committed to the product if it were to persist over the long term.

[24] Little analysis seems to have been done on trade policy in strategic environments where large firms enjoy economies of scope rather than scale. Economies of scope are savings that accrue to a multiproduct firm from "common resources" that have a public-good character within the firm. Examples are advertising to build the firm's reputation, and firm-wide auditing, legal, personnel, and public relations services. The "use" of such services "by" each of the firm's many products does not exclude their "use by" other products — hence, their public-good character and its implied economies. For such multiproduct firms, one might suspect that resources move too slowly (within the firm) from products with subnormal profits to those with supernormal profits. If so, then there may be some potential for policy to make a difference.

In this case, policy might be able to speed up the exit of firms from subnormally profitable products. The reason for doing so is to shift domestic resources toward products with normal or supernormal profits, thereby avoiding ongoing opportunity losses. Trade policies are arguably appropriate if market segmentation implies differences across markets in a firm's profit rates (not all of which may be subnormal). Yet, the implied strategic trade policies are strange! Export taxes might be employed to encourage exit from overseas markets in which domestic firms were surviving by dumping below cost; import subsidies might be employed to speed the shift of resources toward more profitable and productive activities!

That strategic trade policies such as these are "unlikely" (to say the least) is granted. In U.S. law, products from declining sectors are those most likely to pass "material injury" tests and, hence, most likely to receive more import protection, not less. Declining industries with small numbers of large firms — with large plants, large employment, and large community influence — are those most likely to receive innovative kinds of administrative protection, such as trigger prices, voluntary export restraints, and "war chests" to preserve their export market.[25]

Yet, what this shows is that there may be a unique profit-shifting *loss* to many of our most significant trade barriers that is not captured in traditional, competitively conditioned calculations of their social cost. Were we to calculate these social costs for strategic instead of competitive environments, we might come away with a more sobering view of our losses from trade barriers and a more respectful regard for the value of free trade.

Imperfectly Competitive Firms with a "Profit Life Cycle"

In a recent paper, Avinash Dixit[26] has combined the perspective of the two previous sections. In so doing, he has also shown the striking sensitivity of the analysis of strategic trade policy to what is meant by "equilibrium".[27]

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[25] Robert Z. Lawrence and Robert E. Litan (*Pragmatic Approaches for Preserving Free Trade* [Washington, D.C.: Brookings Institution, 1986]) argue without referring to the imperfection of competition that the social costs of phasing out a product with large employment and community influence exceed the firm's private costs. On these grounds alone, downward adjustment would be "too rapid", not too slow. It might be an interesting empirical experiment to try to size up the two offsetting influences for some product.

[26] Dixit, "Strategic Aspects of Trade Policy."

[27] See also Grossman and Richardson, "Strategic Trade Policy," pp. 29–30.

Dixit argues that the case for trade policy as a profit-shifting device may vanish when one takes account of a prenatal phase for a product that ultimately earns supernormal profits. In the prenatal phase, many firms compete with each other via R&D, in lottery-like fashion, to become one of the few ultimate producers. The winning firm earns supernormal profits over its whole life, but the losers "earn" subnormal profits, and the "industry" profit rate thus turns out to be roughly normal. Naive trade policies that aim to preserve or increase the supernormal profits of the winning firms may also increase the losses of the losers by diverting resources into the prenatal R&D competition, having no profit-shifting payoff in the aggregate over firms and phases. Attempts to shift the second-phase equilibrium favorably also shift the first-phase equilibrium unfavorably.

One could imagine, of course, calculating optimal, phase-contingent trade policies, but that illustrates how complex strategic trade policy can become. In fact, it begins to sound more like corporate planning than governance, raising the question of whether U.S. political institutions could ever practically engage in it, a question to which I turn in the next section.

Strategic Trade and Industrial Policy in U.S. Practice

Most of the research summarized above is highly stylized. To assess its practical implications for policy requires an assessment of how accurately the stylizations reflect the real environment, real firms, and real governments. Early empirical work is suggestive, yet inconclusive.[28] It documents some of the preconditions relevant to strategic environments and policy. But it also suggests that these policies do not generate significant effects on national economic welfare, and certainly nowhere near as large as industrial policy alarmists imply. On the other hand, these same effects are large relative to comparable calculations that presuppose a competitive environment. The message thus may be like that of Harris-Cox and the Wonnacotts for Canada: scale economies and market structure matter a lot to empirical estimates, if not necessarily to economic welfare.

On the basis of much more casual reflection,[29] I believe that only defensive, rules-based versions of strategic trade and industrial policy — active dissuasion — have much merit for the United States, given the structure of government and the environment in which it interacts with firms. I also believe that the U.S. government stands a better chance of succeeding in active dissuasion if its object is other governments, not imperfectly competitive firms. I further suspect that aggressive, discretionary, or firm-focused versions of strategic policy would have costly and undesirable side effects in the United States (if not necessarily in other countries).

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[28] For work with a U.S. orientation, see Avinash K. Dixit, "Optimal Trade and Industrial Policies for the U.S. Automobile Industry" (Paper presented at National Bureau of Economic Research Conference on Empirical Methods of International Trade, Cambridge, Mass., April 1986); and Baldwin and Krugman, "Market Access and International Competition." For a British view, see Anthony J. Venables and Alasdair Smith, "Trade and Industrial Policy under Imperfect Competition" (Paper presented at National Bureau of Economic Research Workshop on Empirical Studies of Strategic Trade Policy, Cambridge, Mass., August 1986).

[29] See also Paul R. Krugman, "Strategic Sectors and International Competition," in Robert M. Stern, ed., *U.S. Trade Policies in a Changing World Economy* (Cambridge, Mass.: MIT Press, forthcoming).

Three characteristics of strategic policy and the U.S. policy environment support these conclusions. They can be labeled contagion, fallout, and corporatist co-option.[30]

Contagion

Contagion describes the tendency for discretionary strategic gamesmanship to become epidemic. Krugman[31] and others have pointed out that a government may find it best to abjure seemingly desirable strategic discretion, say, in export policy, if too much governmental freedom of action there birthes a Pandora's box of irresistible pressures for similar "strategic" favors to all special interests. Discretion may encourage costly resource diversion into gaming and lobbying. The point has its analog in parenting. Discretionary favors that one does for the benefit of a responsible child (and the whole family) may not appear so beneficial when irresponsible children exploit them as precedents. Tying one's hands by rules may be better than discretion in a multi-agent game — a perspective associated in other contexts with Gramm-Rudman.

These considerations also provide a reason for restricting the strategic policy domain to shaping the actions of other governments, not of large firms or unions. Unproductive private predation on the public interest thereby can be constrained. Of course, third-party predation by rival governments would still be possible. This problem might be alleviated for the United States by a shift in the scope of its trade policy to cooperative initiatives and dissuasionary rules that are "minilateral" — neither bilateral nor fully multilateral, but somewhere in between.[32] The idea is to form mutually advantageous trade policy coalitions with small numbers of like-minded participants — for example, the Pacific Rim countries, including Canada. Restricting agreements to small numbers of like-minded participants checks predation and free riding by easing the monitoring of adherence to or defection from the agreement. It also keeps bargaining costs low, "internalizes" certain "externalities", and reduces the chance of deadlock and the cost of protracted negotiation.[33] Later, if more combative governments want to join the coalition, let them sue for peace and membership. Minilateral cooperative initiatives in trade policy have more than just abstract appeal. They are the historical norm, illustrated in the early history of both the GATT and its codes governing nontariff measures.

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[30] They are described in more detail in Richardson, "The New Political Economy of Trade Policy," pp. 266–268, 274–278.

[31] Krugman, "Industrial Organization and International Trade," pp. 39–40.

[32] There is some evidence that the United States is moving in this direction, although the favored term is "plurilateral".

[33] Ronald H. Coase, "The Problem of Social Cost," *Journal of Law and Economics* 3 (October 1960): 1–44.

Fallout

Fallout describes the tendency for strategic policy to rain down unfortunate and sometimes unexpected side effects. One possible illustration is cartelization of the global industrial structure.[34] Recent U.S. voluntary restraint agreements with foreign steel producers implicitly grant "first-mover advantage" to U.S. firms by setting imports as a share of U.S. market size. The nature of competitive interchange, therefore, has changed. Conjectures of rival responses are no longer needed. Implicit collusion and so-called leader-follower behavior are encouraged.

Another possible illustration is unpopular income distributional consequences. Most strategic policy redistributes income from foreign firms, and from consumers worldwide, to large national corporations and/or to workers with labor market power. Even if this redistribution yields an increase in overall national welfare, it might be opposed nevertheless. The oft-noted tension between efficiency and equity becomes all the more dramatic when the beneficiaries of policy are firms already earning above-normal profits and workers already earning above-normal wages.

Corporatist Co-option?

One of the most significant reasons for caution in applying strategic insights to U.S. policy under imperfect competition is that the U.S. government may be ill-equipped to manage some of its aspects. This seems especially true in the case of aggressive profit-shifting initiatives and other discretionary attempts to capitalize on attractive market opportunities by policy. The U.S. government seems better equipped, by comparison, to manage defensive strategic policy toward other governments — retaliation, threats, and inducements to behave cooperatively. Defensive policies require reactive, rather than initiating, administration and U.S. trade agencies are inherently reactive.

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[34] Two studies temper this presumption, however. See Julio Rotemberg and Garth Saloner, "Quotas and the Stability of Implicit Collusion," NBER Working Paper no. 1984 (Cambridge, Mass.: National Bureau of Economic Research, June 1986); and Val Eugene Lambson and J. David Richardson, "Tacit Collusion and Voluntary Restraint Arrangements in the U.S. Auto Market" (Paper presented at National Bureau of Economic Research Workshop on Empirical Studies of Strategic Trade Policy, Cambridge, Mass., August 1986). Collusion may be *weakened*, not strengthened, if voluntary export restraints (VERs) and import quotas make it harder for loyal firms to "punish" defecting firms. Indeed, Dixit ("Optimal Trade and Industrial Policies for the U.S. Automobile Industry," p. 20) finds some evidence that the Japanese VER on automobiles strengthened collusion among Japanese automakers, but had little impact on the degree of collusion among U.S. automakers.

Aggressive profit-shifting policy would seem to require that government become "like" its firms — at least a facilitator, perhaps an underwriter, and possibly even a coparticipant in corporate planning — implying a corporate managerial style of government decisionmaking. Such managerial decisionmaking is typically hierarchial — not "democratic". In that light, the United States especially might eschew such policy for political reasons. Aggressive profit-shifting policy also would seem to require the same flexibility as is found in firms. Yet constitutional, legislative, and judicial checks and balances are built into the U.S. political system precisely in order to make government *less* flexible. Americans fear more than most that flexible governments can become capricious and tyrannical. The most flexible of all firms are monopolists. The most flexible of all governments are dictatorships.[35]

Convergence of character between governments and firms, in the long term, may be beneficial for the United States. The U.S. government no doubt was wise to adopt some traits of large firms as it became larger, while abandoning some traits of town meetings. Yet, the benefits are by no means certain, and need to be weighed carefully against political and social costs that are hard to quantify.

To summarize more positively, the U.S. government, on balance, may be more predictably responsive to its citizenry than any other government precisely because it chooses rules more often than discretion, and because it confines its strategic economic thrusts to influencing other governments, not groups already possessing market power. It may do a good job on the broad political front perhaps precisely because it makes so limited an effort on the narrow economic front of aggressive trade and industrial policy.

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[35] One might imagine, only half jokingly, the U.S. Trade Representative's office being placed under the supervision of the Joint Chiefs of Staff.

Report on the Workshop

Richard G. Lipsey

Introduction

The proceedings of the Workshop about shaping a country's comparative advantage through economic policy were guided by Jim Brander's excellent introductory paper. That paper is reproduced in this volume, so I have not tried to summarize it, but the bulk of the discussion on which I do report was inspired by the issues Brander raises.[1]

This paper is divided into five main sections. The introduction deals with some background issues, which include identifying the policy, intermediate, and instrumental variables for shaping comparative advantage. It also discusses the important distinctions among absolute advantage measured in terms of resource costs, absolute advantage measured in terms of money costs, and comparative advantage. The introduction concludes with a brief discussion of the three main strands of economics that meet in the debate about shaping comparative advantage: the industrial policy school, the new industrial organization theory, and the new trade theory. Economists of the industrial policy school, by the school's definition, are favorably disposed to interventionist industrial and commercial policies. The majority of economists who practice the new industrial and trade theories are more orthodox, and most tend to be skeptical of such policies. This part of the introduction tells a little about where in economic theory economists who discuss this issue are coming from. It can be skipped, however, by the reader who is not interested in these aspects of technical economics.

The second section asks the question, Why? What are the reasons for wanting to operate interventionist industrial and commercial policies directed to shaping comparative advantage? The section singles out five major reasons and many subsidiary ones. The five are: to prevent the loss of international competitiveness, to manage the rate and direction of economic change, to obtain the advantages of scale effects, to gain the alleged benefits of major spillover effects from certain strategic industries onto the rest of the economy, and to play strategic games designed to locate in one's own country rather than somewhere else footloose industries that earn large profits or that are otherwise desirable. The discussion then goes on to consider the extent of the differences between those in the industrial policy school and more orthodox economists.

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[1] This Report started out as a rapporteur's summary of the Workshop proceedings. It was relatively short, and it followed both the order and the coverage of the discussion. Since a number of questions and ideas were raised during the Workshop, the Institute continued research on these after the Workshop concluded. Some of this work is now reflected in the second and final parts of this Report. Thus, although most of the issues discussed at the Workshop are included here, they may not appear in the order discussed. In addition, this Report covers issues that were discussed only briefly or not at all. It also reports most of the research suggestions made at the Workshop, but goes on to mention others that did not occupy our attention for long.

The third section asks the question, How? It considers the major instruments for operating interventionist industrial and commercial policies.

The fourth section asks the question, Should? What are the major alleged benefits of such policies? What are the major alleged costs? Can one judge the cost-benefit balance between the two?

The final section discusses the research agenda. Research suggestions range from grand themes to minor tunes, and from purely theoretical work to empirical measurements and tests. Suggested research topics are discussed under two main headings, "general issues" and "case studies". As the C.D. Howe Institute is particularly interested in case studies designed to advance knowledge on this very important policy issue, staff paid considerable attention to suggestions for ones that could be useful.

As John Whalley says in his contribution to this volume, shaping comparative advantage is

> the central issue that has preoccupied trade policy for more than 150 years: whether a policy of free trade or one of intervention, either through protection or export promotion, makes the most sense.

Policy: Goals, Instruments, and Targets

Kinds of Variables

The important ultimate goal of policy — what economists call the policy variable — that was considered at the Workshop is to influence a country's rate of growth of real income, either by once-and-for-all increases in income — as, for example, when a favorable shift in terms of trade is induced — or by sustained changes in growth rates.

The two main sets of policy tools that the Workshop participants considered — what economists call policy instruments or instrumental variables — are industrial and commercial policies. Industrial policies include all of those policies, such as encouragement to particular industries (steel, for example,) or particular activities (R&D, for example), that are not directly aimed at altering the pattern of trade flows. Commercial policies include all measures, such as tariff and nontariff barriers, that are aimed directly at altering the pattern of trade flows.

There are many channels through which policy instruments may influence policy goals. The channel — or what economists call the intermediate variable — that was under scrutiny at the Workshop is altering or, as it is sometimes called, shaping, a country's comparative advantage.

Absolute and Comparative Advantage

Economists, to say nothing of the general public, sometimes are careless about making the key distinction between absolute and comparative advantage. Absolute advantage refers to a direct comparison between two countries' costs of producing a commodity, where those costs can be measured either in terms of resources or money (after conversion to a common currency at some relevant exchange rate). Comparative advantage refers to the relative international competitive positions of a country's products, compared across all of its potentially tradable commodities.

To illustrate these important distinctions, consider three cases, all of which were implicit at one point or another in the Workshop discussions.

First, let a country's price level rise 10 percent relative to the price levels of all other countries. As a result, its money prices rise 10 percent relative to money prices in other countries. This causes a loss of absolute advantage due to a purely monetary change. There is no change in absolute or comparative advantage measured in resource costs of production. Such a nominal change can, and in a free market will, be offset by a second purely nominal change. That country's currency will depreciate by 10 percent on the foreign-exchange market. This will restore all international relative prices, leave unchanged the international terms of trade, and, hence, the perceived pattern of comparative advantage, and leave the country's real income unaffected.[2]

Second, let a country's rate of productivity growth begin by being equal to productivity growth in the rest of the world in all commodities, then let it fall suddenly below the world rate by an equal percentage in all commodities. This is a loss of absolute advantage in terms of resource costs. Now the country's real income will grow more slowly and will fall relative to incomes in the rest of the world. In the short term, a current account deficit will emerge at the current exchange rate. The deficit will be removed, however, by a change in the exchange rate. When the rate changes sufficiently to offset the change in absolute advantage, the patterns of comparative advantage will be restored and trade will continue to flow in the same channels. The unfavorable movement in the terms of trade will ensure that the rate of growth of the country's ability to purchase goods on the international market is equal to the rate of growth of production at home. The "remedy", for those who do not like these developments, is to alter domestic growth rates; it has nothing to do with comparative advantage.

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[2] Of course, there will be real effects in the transition, but the text concentrates on the comparative-static results of comparing two equilibrium situations.

Third, let a country's rates of growth of productivity vary in such a way that its growth of productivity compared with the rest of the world falls in its export industries and rises in its import-competing industries. Now there will be a change in the pattern of comparative advantage measured in terms of resource costs. Since relative prices more or less must follow relative resource costs, there will also be a change in that country's pattern of imports and exports. Industries that formerly were exporters will tend to become import competing, while those that formerly were import competing will tend to become exporters.

We shall have occasion in what follows to see the importance of keeping these three types of changes distinguished from each other.

The Theoretical Background

Three strands of recent economic thinking came together at the Workshop: the new industrial organization theory (the new I.O.), the new international trade theory, and what is sometimes called the industrial policy school. A few introductory comments on these three strands may be useful, although this part may be skipped by readers who are not interested in, or who are already fully familiar with, the underlying theories.

The Industrial Policy School

The views of this school are based on historical observations and case studies of apparent successes and failures in the use of industrial and commercial policy as instruments for promoting economic growth. Japan's success, and then that of the newly industrializing countries (NICs), in particular product lines seemed to many observers to owe little to traditional comparative advantage based on relative factor endowments. If these emerging comparative advantages were not dictated by predetermined variables, they would seem to be amenable to policy influence.

From that premise flow most the issues discussed at the Workshop, which included such questions as: Should governments try to shape their national patterns of comparative advantage? If some governments do it, can others afford not to? What are the costs and benefits of so doing?

The New Industrial Organization Theory

The roots of the new I.O. go back to the 1930s, when economists, led by Chamberlin and Robinson, first began to theorize about product differentiation. But the resulting debate generally was at a high level of abstraction, dealing with questions such as: Is the pure, idealized, price system optimal or nonoptimal?

The first characteristic of monopolistically competitive industries follows immediately from the assumption of product differentiation. When the typical manufacturing industry produces a large number of differentiated products, substantial unexploited scale economies can persist in equilibrium — that is, firms can be producing at levels of output where their long-run costs are declining.

In the early models, each one of an industry's differentiated products was assumed to be produced by a separate firm, so that industries with many differentiated products also had many firms. Subsequently, it was realized that although the typical industry manufacturing differentiated products has hundreds of products, it has only a few firms. This results in the second characteristic of the new models: large profits persist in such oligopolistic industries, and are not eroded away easily by entry.[3]

Another important key to the development of the new I.O. concerns entry deterrence. It starts from Schelling's seminal distinction between an empty and a credible threat — Schelling calls the latter a commitment. An incumbent firm's threat to engage in a mutually harmful price war if a new firm enters may prove to be an empty threat. If the new firm calls the incumbent's bluff by entering the industry, the incumbent's own self-interest will lead it not to carry out the threat of a price war that will reduce its own profits. Foreseeing this, the potential entrant will not be deterred. The new I.O. emphasizes the role of sunk capital in giving incumbent firms a commitment to the market that can deter potential new entrants, all of whose costs are still avoidable. If the incumbent firm has sufficient capacity, and if it follows its own self-interest after entry of a new firm, the market may become unprofitable for both firms after the new firm's entry. Foreseeing this, the potential entrant will be deterred.

These considerations lead to the third characteristic of the new models. In highly profitable industries selling differentiated products and subject to falling long-run costs, the few firms that get into the market first may preempt it, effectively preventing further entry by the mere presence of their sunk capital, without needing to engage in any overt, entry-deterring behavior.

Consistent with everything said above, the new I.O. then splits into the two branches that Archibald, Eaton, and Lipsey call the "address" and the "goods-are-goods" (or nonaddress) branches.[4] The address branch takes characteristics as the basic concept and defines goods by their location; hence, their "address", in characteristics space.[5] It thus defines goods as bundles of characteristics. The goods-are-goods branch follows standard neoclassical value theory in taking the set of all possible goods as the basic concept. It takes goods as something requiring no prior explanation. They are just there and each good, for reasons not analyzed, is quite distinct from every other good; hence, the appellation, "goods-are-goods" models.

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[3] Chamberlin's result, that zero profits are a feature of long-run equilibrium in monopolistically competitive industries, follows from his famous symmetry assumption that the entry of one new differentiated product takes demand equally from all other differentiated products. As Kaldor quickly saw, as soon as the assumption that all products in the industry are equally good substitutes for all other products is dropped, pure profits will not be competed away easily and may become a feature of long-run equilibrium.

The discussions at the Workshop concentrated on the insights to be gained from the nonaddress branch of the new I.O. Since then, I have come to believe that the address branch offers a slightly different set of insights that might have further illuminated some of the issues debated at the Workshop. As a result, I have written the short technical note included as the last paper in this volume.

Trade Theory

The Workshop's other main strand was trade theory. Both the old and the new trade theories offered important insights.

The old trade theory. The Workshop devoted considerable attention to the classical Ricardian model, and much of the verbal discussion stressed its shortcomings. No doubt much of the criticism was well directed: the Ricardian model does not contain all the insights that we now think we have into issues of foreign trade. But, as Brander and Richardson correctly stress, it does contain many that remain relevant for current policy discussions.

Two of the major insights of classical trade theory that I would stress are (i) that it is comparative, not absolute, costs that drive trading relations; and (ii) that the gains from trade depend on the volume, and not on the balance, of trade — that is, trade is not a zero-sum game.

All too often, policy debates are driven by arguments that deny either or both of these notions. For an example of point (i), many people feel that a country must keep ahead in absolute costs at the current exchange rate if it is to remain competitive. Such ideas are not just the prerogative of the masses; they can be found at any bankers' convention that discusses the consequences of inflation. For an example of point (ii), many people continue to argue that if a country's exports of product X fall, its balance of trade will go into deficit, thus reducing total employment and national income by the amount of the fall in exports.

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[4] G.C. Archibald, B.C. Eaton, and R.G. Lipsey, "Address Models of Value Theory," in J.E. Stiglitz and G.F. Mathewson, eds., *New Developments in the Analysis of Market Structure* (Cambridge, Mass.: MIT Press, 1986), pp. 3–47.

[5] The analysis turns out to be remarkably similar to cases in which firms are differentiated by their location in geographic space; hence, address models seek to unify the study of geographical and product differentiation.

The new trade theory. One of the key influences in the growth of the new trade theory was the experience following the signing of the Treaty of Rome. Many economists, with intuitions honed on classical trade theory using the assumption that each industry produced a single, homogeneous product, predicted the rise and fall of whole industries in each of the original members of the European Economic Community. But this is not how it happened; whole industries did not disappear. Instead, each country tended to specialize in particular differentiated products within any one industry. More or less, each industry survived in each country by identifying particular product niches in which it could compete and by vacating other niches that could be better served by the differentiated products produced in other countries.

The first response to this development was a series of empirical studies with limited theoretical background. One strand of this research documented the phenomenon of intra-industry trade among industrial countries.[6] A later strand involved building computational general equilibrium models.[7] The approach taken in the general equilibrium models to deal with differentiated products was to assume that each good produced in each country was distinct from each good produced in every other country. This assumption, known as the Armington assumption, provided a rough approximation to the reality of trade in differentiated products. Caution must be exercised, however, in drawing policy conclusions from this analysis because of the arbitrary nature of this assumption.

Recently, trade theorists have sought to incorporate some of the results of the new I.O. into their analytical framework. In particular, models of monopolistic competition have been integrated into the more familiar Heckscher-Ohlin analysis in an effort to obtain testable predictions about the pattern of trade among industrial countries and with developing countries. Although further analytical and empirical research is warranted, the Heckscher-Ohlin theory — that trade is explained by differences in relative factor endowments — appears to be surprisingly robust. Evidence in this regard is contained in a recent monograph by Leamer,[8] who carefully articulates and then tests the Heckscher-Ohlin theory against empirical evidence. Leamer finds considerable evidence to support the theory. One explanation for this result is suggested by the analytical efforts to synthesize the inter-industry Heckscher-Ohlin analysis and the intra-industry differentiated products analysis. Preliminary theoretical work by Helpman[9] and others suggests that intra-industry trade should be concentrated among countries with similar income levels and factor endowments, while inter-industry trade should dominate among countries with different income levels and divergent factor endowments.

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[6] See, for example, B. Balassa, *Trade Liberalization among Industrial Countries: Objectives and Alternatives* (New York: McGraw-Hill, 1967); and H.G. Grubel and P.J. Lloyd, *Intra-Industry Trade* (London: Macmillan, 1975).

[7] See J. Shoven and J. Whalley, "Applied General Equilibrium Models of Taxation and International Trade," *Journal of Economic Literature* 22 (1982): 1007–1051.

The synthesis of trade theory and the new I.O offers the potential for a rich set of insights into the determinants of patterns of trade, direct investment, and dynamic comparative advantage. But more analytical and empirical work needs to be done to clarify the implications of this research for policy.

Why Would Governments Want to Intervene?

Brander argues, and Tyson agrees, that the reasons for policy intervention to raise living standards by shaping comparative advantage must be explicable in terms of economic theory (or else be clearly noneconomic in direction). Geroski, however, feels that Brander's exclusive reliance on market failure is too narrow. He argues that there are two additional reasons for such a strategy. First, there is what he calls "political market failure". Sunset industries tend to be large and influential, and thus have a potent political pull. Sunrise industries, however, tend to be small, dispersed, and uncertain of their future — only a few who rise with the sun will live to see high noon. Because of this, sunrise industries are naturally underrepresented in the political process, and an industrial strategy could become their political voice.

Most participants accepted this argument in principle but wondered if afternoon and sunset industries might not capture the industrial strategy organization and use it for their own purposes, just as so many regulatory bodies have been captured by those they sought to regulate. (Geroski's second reason for wanting to go beyond Brander's analysis concerns the issue of the optimal rate of adjustment, which is discussed below.)

In comments, other participants expressed some discomfort with economists' perspectives on the issue of policy intervention. They felt that economists often see social and political forces as impediments to be removed so that optimal economic adjustments then could be made by the market. Instead, they argued, such forces often should be seen as given constraints that policymakers should accept and then work around.

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[8] E. Leamer, *Sources of International Comparative Advantage: Theory and Evidence* (Cambridge, Mass.: MIT Press, 1985).

[9] E. Helpman, "International Trade in the Presence of Product Differentiation, Economies of Scale and Monopolistic Competition: A Chamberlin-Heckscher-Ohlin Approach," *Journal of International Economics* 11 (1973): 305–340.

Reasons for Intervention

The main reasons that emerged from the Workshop for intervention to alter comparative advantage are listed and discussed below. Economists have long recognized some; others come out of the newer trade and I.O. literatures. All have to do with the theory that the forces determining comparative advantage are within the reach of government policy.

The order of discussion is as follows. I first consider the concern that seems to me to be the most influential in the minds of policymakers in many industrial countries: that interventionist trade and industrial policies are needed to stem their countries' perceived loss of international competitiveness. This allows me to deal with some important potential confusions, particularly the one between absolute and comparative advantage. I then consider the general issue of managing the contraction and expansion of various parts of the economy, which is a natural response to concern about the loss of competitiveness. Then I briefly bring in industries subject to scale effects, the existence of which provides a long-accepted reason for managing and directing industrial expansion. Next, I go on to the question of strategic industries and spillovers, the alleged importance of which is one of the key arguments for policies to manage expanding industries. According to the interventionist view, these industries may be worth attracting for their spillover effects even if their own revenues never cover their own costs. Finally, I consider arguments for attracting footloose industries, which are expected to be profitable in themselves once attracted. This raises the strategic considerations so prominent in the new of I.O. and trade theories.

All of these major topics were discussed at the Workshop, but not in the order in which I now deal with them.

To Defend Against Loss of Competitive Position

Probably the most persuasive argument heard among practical policymakers for taking the issues discussed at the Workshop seriously is that countries not following interventionist industrial and commercial policies inevitably will fall behind countries that are. The most common cause for concern lies in the evidence that Japan and the NICs are rapidly overhauling the United States, Canada, and the European Community (EC) in per capita real GNP. Brander sounds some important notes of caution in interpreting this evidence, but for purposes of the present discussion it can be taken at face value.

Three interpretations: This evidence has been given many interpretations. Here are three of the most common. First, it has been argued that this is just a natural evolution of the world economy, whereby more and more countries' development strategies are succeeding with the result that the relative shares of trade of older industrial countries inevitably will fall, as will their lead in per capita GNPs. Since there are externalities and scale effects, all countries gain by this growth of world income and trade. Any loss of relative position is the inevitable concomitant of the sharing out of absolute gains in world income. In this case, there is no problem that requires solution.

The second interpretation is that the decline of the older industrial countries is the result of poor economic policies that have depressed their rates of productivity growth below what natural market forces would have produced. In this case, the problem is to develop sensible policies that allow natural market forces to produce results that then will be comparable to those of the more rapidly growing countries.

The third interpretation is that the decline is the result of the older industrial countries not following those active policies that the rapidly growing countries are following and that are producing growth rates faster than unaided market forces would produce. In this case, the success of the rapidly growing countries is due to their activist policies; unless the older countries adopt such policies out of sheer self-defense, they will continue to fall behind.

In the first case, there is no problem of loss of competitiveness. In the second case, the problem is that the existence of bad policies has caused the industrial countries to do worse than if the market were less hindered. In the third case, the problem is that the absence of interventionist policies has caused the industrial countries to forego the opportunity, already seized by others, of doing better than would the unaided market. It is possible, of course, that some combination of any two, or even all three, of these explanations is working in the various sectors of one economy.

Loss of absolute advantage. Neither Tyson, who argues that the loss of competitiveness is a serious problem, nor Brander, who critically assesses this view, discusses how much of the argument depends on a loss of absolute advantage and how much depends on a shift in comparative advantage.

It seems to me that much of the concern of loss of competitiveness must be with loss of absolute advantage. For example, in support of some of her conclusions, Tyson cites a discussion by Thurow that is definitely couched in terms of absolute advantage.[10] Let us see how this argument runs. Assume that U.S. productivity is growing at 1 percent, while the rest of the world's productivity is growing at 3 percent. U.S. products then stay competitive if the U.S. dollar depreciates at about 3 percent on the foreign-exchange market. This allows U.S. consumption of domestic goods and imports to rise at 1 percent per year. (This analysis depends on the assumption that U.S. money prices and wages continue to rise at the same rate as prices and wages in other countries.)[11]

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[10] L.C. Thurow, *The Zero-Sum Solution* (New York: Simon and Schuster, 1985), Chapter 4.

It is wrong, however, to suggest that the fall in the exchange rate, or the state of international competitiveness, is the cause of any loss of relative U.S. living standards. There may be some cause for serious concern over what is happening, but the problem, as posed, is a purely domestic one: the low rate of growth of U.S. productivity. The problem would be the same in a closed society. All that the fall in the exchange rate does is to make the U.S. rate of growth of consumption of imports conform to the rate of growth of overall consumption that can be sustained by the rate of growth of U.S. productivity. The remedy lies in policies, micro or macro, that will increase the rate of U.S. productivity growth.

Tyson repeats this case from Thurow and argues that it describes a severe competitiveness problem. Her reasons follow.

- Poor U.S. domestic policies have caused severe deteriorations in the United States' relative endowments of capital, skilled labor, and technology.
- The amount of potential loss due to the deterioration of the United States' terms of trade is underestimated because the deterioration will accelerate if U.S. growth accelerates.
- The view that the United States is in a market-driven shift from manufacturing to "information-based services" is questionable because (i) trade in services is small; (ii) the United States' share of services trade is declining; (iii) many services are "tightly linked" to manufacturing industries; and (iv) many services jobs are low paying and, hence, undesirable.
- Relative positions in the per-capita-GNP league matter at least as much as absolute positions.

I find all of this very perplexing. The evidence referred to in the first point is complex and difficult to assess, but I am willing to believe there is something in it. The second point seems obscure and a reading of the passage in Thurow to which Tyson refers does not help. If the United States' pattern of specialization happens to be such that balanced world growth turns the terms of trade against it, then some of the benefits of

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[11] For a more complete analysis of the possibilities, see R.G. Lipsey, "Models Matter when Discussing Competitiveness: A Technical Note," in this volume.

U.S. growth will be transferred abroad (just as the fall in the relative prices of computers transferred some of the gains resulting from falling computer costs to noncomputer industries). But the rest of the gains remain at home to raise domestic living standards. Under these circumstances, if the United States grows faster, more absolute income will be transferred abroad and more absolute income will also become available at home. How this shows a failure of U.S. international competitiveness is obscure to me.

This argument cries out to be modeled, which should not be too difficult. Until it is, critics will be unsure of how to interpret the argument in order to assess it. Advocates will be free to say "that is not what I meant" to any specific, unfavorable interpretation. The less sophisticated will go away believing that Thurow has demonstrated that the magnitude of the long-term deterioration in the terms of trade due to loss of international competitiveness reveals "just such small persistent differences that led Great Britain to slip from number one...to a position near the bottom of the industrial countries...eighty years later."[12]

Now let us look at Tyson's third group of reasons, those concerning services. On (i), I am not sure how the point that trade in services is small, if correct, would contradict the proposition that the United States is in the midst of a market-driven shift to information-based services industries. In any case, I understand that the statistics on the services trade are dubious because of the difficulty of separating services from goods, especially in firms that deal in both. On (ii), concerning the declining share of U.S. services in world services trade, one must continue to emphasize that in a world in which more and more countries engage in more and more trade in services, loss of relative share is not a reliable indication of loss of anything else. Tyson's points (iii) and (iv) can be placed into a comparative advantage framework, so I postpone their consideration until a later section.

On Tyson's last point, I have no doubt that relative positions do matter to people's welfare, particularly within one geographical area where visual comparisons cannot help but be made. It is not quite so clear how much it matters between, say, a Spaniard and an American. No doubt, however, Americans will lose a great deal of psychic income once they are clearly out of first place in the per-capita-GNP league. This tells us that the loss of absolute advantage is a real problem in economic welfare, but it does not do anything to make it an international problem in changing comparative advantage.

Furthermore, although loss of relative position is a real problem, its importance should not be overstressed. After all, there can only be one top country in per capita GNP, and most people in the advanced industrial countries are very much better off than were their grandparents, even though their particular country may have changed from n to m in international ranking, where n and m can be anything from 1 to 20.

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[12] Thurow, *The Zero-Sum Solution*, p. 99.

So far, the case that there is a genuine international problem associated with trade, requiring trade-oriented solutions, does not seem to me to have been made. There is, however, a case for the possible existence of domestic problems arising out of slow rates of domestic productivity growth and requiring solutions that are directed to altering productivity growth — solutions that would be the same if the economy were open or closed.

Changing comparative advantage: There is no denying the genuine concern about the perceived loss of competitiveness in the United States, Canada, and the EC. It seems to me, however, that what is needed to make this into a concern with ramifications for international trading relations is that it should cause an undesirable alteration in comparative advantage.

I consider two classes of examples that can have these effects. The first fits into standard theory; the second fits into address models.

For an example of the first class, assume that products newly coming onto the market tend to have very high income elasticities. Countries heavily specialized in these products, therefore, may expect to have favorable shifts in their terms of trade. If loss of competitiveness means less and less production of new products, then it may imply steadily deteriorating terms of trade as production shifts to commodities with lower and lower income elasticities of demand.

For a second example, consider traded services. High-wage services industries may need more R&D than low-wage services industries to keep up with the competition. If a country loses its R&D capability, it may find the pattern of production shifting from high- to low-wage services jobs with an absolute loss of living standards. I state these arguments not to endorse them but to illustrate what is needed to link concern over loss of competitiveness with the need for commercial or industrial policies designed to alter comparative advantage.

A third example of the same class of issues can be developed from Tyson's discussion of services outlined above. In that discussion, she makes two points. First, many knowledge-based services jobs are linked to the sale of related goods. For example, Tyson notes that "erosion of the U.S. competitive position in semiconductors and computers is likely to spill over into an erosion in related engineering and design services, software design, business consulting services, and repair and maintenance services." Second, there is a distinction between "good" services jobs, which are in high-value-added industries that produce high wages, and "bad" services jobs, which are in low-value-added industries that produce low wages.

What Tyson suggests is that the loss of comparative advantage in manufacturing cannot be assumed to shift jobs to high-wage, knowledge-based services industries. Instead, these "closely linked" services jobs may lose comparative advantage as well and be replaced by "bad" services jobs. In this situation, there may be a case for policy intervention to alter comparative advantage back toward manufacturing.[13]

The second class of examples, those fitting into address models, is discussed in the technical note that appears elsewhere in this volume. That note suggests that intuitions honed on goods-are-goods models may be somewhat misleading on this issue. Goods-are-goods models display continuity, and a slow loss of competitive advantage can be offset by a slow change in the real terms of trade brought about either by a slow reduction in domestic money costs and prices or by a slow fall in the exchange rate. Address models, however, are replete with discontinuities. A small slippage in the race to develop new products can lead to dramatic shifts in comparative advantage that cannot be restored by gradual changes in exchange rates and, hence, to major declines in exports of particular products. In these cases, small losses of competitiveness can lead to large losses of real income resulting from major shifts in comparative advantage. Measures to prevent these losses of competitive edge, if effective, will have big payoffs in terms of maintaining real income.

In summary, to make the concern about loss of competitive advantage an issue of trade theory and thus relevant to matters discussed at the Workshop, it needs to be established that there is some differential loss in competitive advantage that is changing the pattern of comparative advantage in ways that are both undesirable and capable of being altered by some interventionist policy.

To Manage Adjustment

Concern over competitive position leads to a call for interventionist policies designed to alter existing patterns of comparative advantage, or to shift production away from those patterns, in order to alter the economy's direction and rate of adjustment in response to the many shocks that impinge on it. In this section, I discuss altering rates; later, I discuss altering directions. To have an economic rationale, the alteration needs to be in the direction of the socially optimal rates that present market reactions are not producing.

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[13] The discussion of this third example raises a factual question. It is agreed that the number of low-wage services jobs in such industries as fast foods is rising, but the number of unskilled manufacturing jobs in such industries as textiles, apparel, and footware, which are also low-wage industries, is falling. Has the size distribution of income changed toward the bimodal, suggesting the polarization of jobs into "good" and "bad"? Or has it remained about the same, suggesting a replacement of old "bad" jobs with new "bad" jobs, but no real deterioration of opportunities in terms of the proportions of "good", "medium", and "bad" jobs throughout the whole economy? If there have been net shifts toward "bad", or low-wage, jobs, is it because of shifts in demand, or shifts in the composition of labor supply due to demographic developments?

This issue turned out to be one of the most contentious of the entire Workshop. Brander refers to the "natural rate of adjustment," suggesting that the unaided market would provide the optimal rate of adjustment to expansionary or contractionary shocks that hit particular sectors. Many participants disagreed. They argued that whatever the free market might do to produce static efficiency, it could not be expected to produce the optimal dynamic adjustment. Even if something like this did occur in the Arrow-Debreu model, the required conditions could never be fulfilled in the real world. For example, moral hazard precludes the existence of many of the futures markets (such as one in which firms could insure against their own bankruptcy) that are required for intertemporal efficiency.

Another reason for objecting to Brander's conjecture is that the new I.O. suggests reasons why intertemporal market adjustments to exogenous shocks may be nonoptimal. For example, Eaton and Lipsey, in an address-branch application, show that the scramble to preempt a growing spatial market that would yield pure profits in static equilibrium will lead to early entry of capital and dissipate much of the pure profits in a socially wasteful way.[14]

Managing decline. As one aspect of the adjustment problem, many participants felt that industrial policies were needed to manage the decline of sunset industries. It was suggested that many advanced industrial countries could learn from the Japanese experience. One of Japan's alleged successes has been its willingness to permit the phasing out of production in industries that are growing up in the NICs, allowing Japanese resources to move to higher-income-creating lines of production and providing a ready market in Japan for the products of the NICs, thus allowing them to buy "up-market" goods from Japan.

The contrast with other industrial countries is interesting. Many are trying to maintain industries, producing such products as cheap shoes and clothing, that can generate only low wages and that are in direct competition with some of the NICs and many of the developing countries. At the Workshop, Geroski suggested that many European governments are resisting, rather than encouraging, adjustments called for by the market. Dixon suggested that the same point could be made for Australia.

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[14] B.C. Eaton and R.G. Lipsey, "The Theory of Market Preemption: The Persistence of Excess Capacity in a Growing Spatial Market," *Economica* 46 (1979): 149–158.

Although some might think it best to leave sunset industries alone to decline at their market-determined natural rate, few governments have been able to resist political pressures to intervene to slow adjustment. So the second-best solution may be to devise a more general strategy for dealing with sunset industries, one that would be more coherent than the politically motivated set of *ad hoc* reactive measures now used.

Managing expansion. The reasons for wanting to manage the growing parts of the economy are, first, to influence what industries a country will have — for reasons discussed in other sections — and, second, to manage the growth rate of new industries.

Since Workshop participants heard so much about change-resisting policies with respect to declining industries, it may be worth pointing out that, in a fully employed economy (or a fully employed, relevant manufacturing sector), trying to slow down exit of resources from declining industries while simultaneously speeding up the entry of resources into expanding industries can be self-contradictory.

Most of the discussion at the Workshop concerned which industries to attract. Not much attention was given to the problem of managing the growth rates of existing expanding industries. This is, of course, partly for the reason implicit in the discussion in the previous paragraph. Although politicians often see the rate of decline of some sectors and the rate of growth of others as separate issues, economists see them as one: the optimal rate at which resources are reallocated from declining to expanding parts of the economy.

Static and Dynamic Scale Effects

Two reasons for managing expansion concern the effect on an industry's costs — and, hence, its comparative advantage — of its scale of output either at a moment of time or over a period of time. These reasons have long been in the textbooks, so they need only detain us momentarily here.

The infant-industry case. Unit costs in some industries decline as current output grows. Hence, current comparative advantage can be changed by a policy that changes the rate of output in that industry.

The learning-by-doing case. Unit costs in some industries decline as the industry's accumulated past output increases. Hence, comparative advantage will change over time as the total of all past output rises, and can be changed by any policy that alters the industry's rate of output.

John Whalley makes the economist's standard comment on these two reasons for policy intervention:

> Only when there is some market failure, whether in financial markets or of an informational nature, is there a clear rationale for government intervention. Indeed, in such cases, the rationale for intervention may not be in the form of conventional industrial policy but may call instead for dealing more directly with any market failures identified.

I sympathize with those who suspect that government agencies, dispensing taxpayers' money through tariffs or subsidies, are likely to be captured by the recipients, and in any case are unlikely to get right their calculations of the long-term social interest. But this does not make any the less questionable Whalley's suggestion that the rational policy might be to locate, and seek to remove, the kind of market failures that prevent an Arrow-Debreu world of perfect futures markets from being achieved. Those who felt that this was the wrong policy direction argued, for example, that governments are unable in practice to remove the capital-market imperfections that prevent a firm from borrowing all it needs to exploit a perceived learning-by-doing gain that will take many years to achieve. They also argued that even if policy could remove these capital-market imperfections, there are no feasible policies that could internalize the alleged spillovers onto related industries. (See the discussion of spillover effects that follows.)

To Gain the Benefit of Spillover Effects

The argument here is that there are certain key, or strategic, industries that have major, beneficial, external effects on much of the rest of the economy. These industries will not produce at the socially optimal level because their private owners will be unable to appropriate the full value of the marginal social gains yielded by their industries.

In a closed economy, there will be too little output from industries yielding positive spillovers and too much from those yielding negative spillovers. World welfare can be increased, therefore, if those countries that have a comparative advantage in industries with positive spillovers subsidize their rates of production so that they are higher than they would be under purely free-market influences.

The present proposal, however, is to attract to one's own country an industry that yields these external spillover effects when it otherwise would go elsewhere. So from the point of view of national policy, this is an attempt to relocate industry rather than to increase the value of world output.

Notice that it could be in the narrow self-interest of one country to attract one or more strategic industries even if that country never developed a comparative advantage in those industries. Provided that the cost of the continuing subsidy, tariff, or whatever other inducement is used is less than the value of the spillovers, the country would be a gainer (even though the world would be a loser).

It is clear that members of the industrial policy school put major emphasis on the size of spillover effects coming from strategic industries. What, then, are the spillover effects that would justify trade and industrial policy designed to locate certain strategic industries in a country? What, also, are the characteristics of a strategic industry?

Having first indicated that the concept of spillovers is more embracing than the concept of externalities, Tyson makes the following points:

> [I]n the 1950s and 1960s, [Japanese] steel and shipbuilding were promoted because [of spillovers] in the form of infrastructure for other industries....Japanese success in...autos and machine tools [may have been based] in part on [access to] cheaper, higher-quality steel and to cheaper imported raw materials that the infrastructure provided.
>
> [T]he Japanese view semiconductors, computers, and telecommunications as the infrastructure on which the future competitive success of a variety of industrial sectors depends....[The conventional economic analysis] overlooks the fact that there are major setup costs and irreversibilities involved in R&D.
>
> [S]ystemic innovations require the kinds of coordinated information flows and investment plans that are fostered not by arms-length, price-mediated relationships among firms but by stronger forms of organizational linkage....From a national perspective, this suggests that government policies to promote the flow of technological and R&D information among firms, or to promote the coordination of investment and R&D activities, can speed the innovation and diffusion process.
>
> [T]echnological change...involves the creation of...a pool of specialized knowledge and...specialized labor [that] is not easily retained within...national borders. Thus, an important externality of market-promotion policies in high-technology sectors is the creation of a national pool of R&D talent and the maintenance and strengthening of the human capital necessary to innovate.

These quotations identify steel and shipbuilding as strategic industries of the past, and semiconductors, computers, and telecommunications as strategic industries — and R&D as a strategic activity — of the present. They also identify as examples of spillovers higher-quality steel than could have been imported, cheaper imported raw materials in general, and infrastructure that served the early strategic industries. Examples suggested as industries benefiting from the earlier spillovers are autos and machine tools.

Furthermore, Tyson says that spillovers from systemic innovations are such that "price-mediated" market relationships will not lead to their optimal rate of introduction. This is almost true by the definition of the word systemic, so the important question is: To what extent are certain innovations systemic in the sense of affecting the whole economic organism in such a way that there will be major spillovers not caught by innovators' profits in spite of current patent laws?

Two impressions stand out. First, these effects conceivably are very large — large enough to swamp any cost-benefit analysis of consumers' surpluses in the markets directly affected. Second, these effects are very difficult to specify precisely enough to make them measurable, which may have been why they were not more fully discussed at the Workshop.

As long as there are few, if any, measurements of spillovers, and as long as they are one of the major reasons quoted for an interventionist industrial strategy, this important aspect of the policy debate will remain in the unsatisfactory state of "your guess against mine".

To Attract Footloose Industries

An important motivation for policies designed to shape comparative advantage is to attract footloose industries — that is, industries that are little influenced by any country's traditional patterns of resource endowments. Once established, however, such industries are supposed to develop a comparative advantage in their country of location that will hold them there without further policy intervention. They may have, for example, a steep learning curve so that, once fully established, they develop costs lower than those of any potential new entrant. In Tyson's words, "a large and growing part of world trade consists of exchanges that do not reflect national differences in resource endowments....For trade in these products, it seems obvious that national policies can have an enduring effect on trade flows and national welfare."

David Richardson's paper contains much wisdom on the issues mentioned in this section and is well worth reviewing at this point. As Richardson points out, there are two quite different motives for engaging in active policies designed to attract footloose industries, one aggressive and the other defensive.

The aggressive motive dominates the country that seeks to be in the forefront of these activities and hopes to attract as much as possible away from other countries. To justify such "beggar-thy-neighbor" policies on a national basis, even when they are successful, it needs to be shown that locating such industries in the country in question is a more productive use of its scarce resources than the alternative uses. This is no easy task.

The defensive motive dominates when a country is reacting to the behavior of others. For example, governments in many of the NICs and in Japan seem actively to be encouraging their own growth of production in these footloose industries. If so, then for any given level of world demand, there will be less room for production in countries whose governments do not take similar active steps. As Richardson points out, it is one thing to advocate a passive strategy for all governments, but when some adopt interventionist strategies, following a passive strategy oneself is to allow others to "beggar us".

Why should one want to attract footloose industries? One reason that follows from the new theories is to locate in one's own country an enterprise with the potential to earn supernormal profits that would otherwise be located abroad. To illustrate, say that scale economies are such that two firms in an industry serving an international market will make large profits, while three will make losses. The first two firms in the market will have preempted it, and if a country can locate one or both of these firms within its borders, some of the profits earned at the expense of foreign purchasers will accrue to that country. (The taxed portion will, but the distributed portion will not, unless the firms are owned locally.)

This argument refers to what is called the "integer problem". Capital indivisibilities determine some minimum size, K, for each plant in the industry. (For ease of analysis, assume that each plant must be owned by a separate firm.) For any given size of a market that will support at least one firm, it normally will be the case that n firms will be able to make profits, while n + 1 firms will incur losses. If n is small, profits for n firms may be large, even though profits for n + 1 firms are negative. This has always been recognized as a source of profit under the term "natural monopolies" (and, of course, it extends, as suggested above, to natural duopolies and natural oligopolies).[15]

The new I.O., by emphasizing product differentiation and oligopoly, greatly increases the range of situations in which pure profit will exist. Brander reviews many of the various possibilities, some due to his work, in his contribution to this volume.

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[15] The profits supported by the integer effect rapidly diminish as the market expands in size. As demand grows, the largest number of firms that can make profits grows, but the profit each firm can make diminishes quickly when n + 1 firms make small losses. Thus, the integer problem is a small-group problem.

As far as I am aware, all of the analysis of this issue in the new trade literature has used goods-are-goods models. These lead to the presumption that such profits, although often large and persistent enough to be worth preempting, sooner or later will be eroded by entry. Address models of value theory allow for a further, potentially important possibility: that profits can exist in static, free-entry equilibrium, and with a magnitude of up to twice the normal rate of return on capital.[16] As a result, the incentive to preempt a market is even stronger than when profits are a phenomenon only of disequilibrium situations — albeit persistent ones.

The new theories suggest considerable potential for strategic behavior motivated by the desire to attract industries that earn supernormal profits. A number of participants in the Workshop pointed out, however, that many countries seem to be identifying the same set of potential winners, usually in the high-tech area. The danger clearly is that the political bandwagon effect could be disastrous. For example, where there might be room for two or even three national industries to be profitable, six or eight would try to enter and all would incur losses. In these circumstances, the smart small country would look for a niche "despised and rejected" by all the others and hope to come out better than if it had climbed on the bandwagon. Few participants felt, however, that politically oriented policymakers would be this cunning.

Although the new theories suggest that a snapshot of the economy may show substantial pockets of industries with supernormal profits, there are lines of analysis suggesting that such a view may overstate the real amount of profits to be earned from given lines of activity. The most important arguments leading to this conclusion follow from life-cycle models of firms, products, and industries. Dixit has suggested a life cycle that includes the R&D phase in which the later flow of what looks like pure profits is only compensation for an earlier flow of subnormal profits.[17] Eaton and Lipsey have studied something similar for the early entry of capital into an expanding market in which the pure profits available in final equilibrium are largely competed away (in a socially wasteful manner) by the early entry of capital.[18]

The life-cycle perspective raises an interesting possibility. Assume that, as often happens, a government offers major help from public funds at the R&D stage of a new product or industry. The government might, for example, cover the cost of developing the prototype of a new aircraft design or a new computer under its defense contracts. If the product goes on to be a commercial success, private firms will count this a profitable piece of government intervention and lobby for more of the same. Looking only at the high profits earned at the later stages, a researcher may also conclude that the government's strategic behavior was successful. A cost-benefit study over the whole life cycle, however, may find that the initiative brought losses rather than gains. This illustrates how easy it is to be misled by appearances and that there is no substitute for careful measurement, asking the questions that good theorizing suggests really are the relevant ones.

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[16] The key result is proven in B.C. Eaton and R.G. Lipsey, "Free Entry and the Existence of Pure Profit," *Economic Journal* 88 (1978): 455–469. Its significance is discussed in Archibald, Eaton, and Lipsey, "Address Models of Value Theory"; and in B.C. Eaton and R.G. Lipsey, "Product Differentiation," in Richard Schmalensee and Robert Willig, eds. *Handbook 10: Handbook of Industrial Organization* (Amsterdam: North-Holland, forthcoming). An intuitive explanation is given in Lipsey, "Models Matter."

[17] A.K. Dixit, "Trade Policy on Agenda for Research," in P. Krugman, ed., *Strategic Trade Policy and the New International Economics* (Cambridge, Mass.: MIT Press, 1986).

[18] Lipsey and Eaton, "The Theory of Market Preemption."

Are Generalizations Possible?

Although the new I.O. and trade theories suggest cases in which commercial and industrial policy interventions can be income increasing, Brander argues — and most participants agreed — that these cases are assumption-specific. Hence, few generalizations may be possible, with each case for a policy intervention having to be judged on its specific merits. For example, the favorable or unfavorable response of an industry's firms to an industrial policy might depend on whether those firms use price or quantity as their strategic competitive variable.

While not disagreeing with the thrust of this conclusion, it seems to me that there are some general results that, if established, would affect our inclination for or against interventionist industrial policies. Here are four results that, *if true*, would tend to add force to arguments in favor of such policies — while in no way removing the need to judge each suggested intervention against the specific characteristics of the market in question.[19]

- Large and widespread pure profits persist for a long time and may even be a condition of free-entry equilibrium in many industries. These profits can be preempted by whoever gets sufficient capital committed to the market first.

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[19] The first two of these follow in their extreme form from address models. The positive-profit result follows from the fact that when a new product is fitted into a characteristics space inhabited by a number of existing products, its typical expected market is discretely smaller than the markets enjoyed by existing products before entry occurred. The second result happens where discrete jumps in sales occur as a result of small changes in the location of products in characteristics space. In goods space, by contrast, everything is continuous, so that small shifts in production conditions always can be compensated for by small changes in prices or exchange rates. The third and fourth results, if established, could be accommodated in either goods-are-goods or address models.

- Falling behind a little in the race to develop new and better products can bring big losses — losses of a size not suggested by traditional goods-are-goods models but to be found in address models.
- Production in many lines is footloose because costs are not influenced strongly by existing factor endowments.
- Externalities and spillover effects are widespread and quantitatively important.

Differences of Style or of Substance?

Orthodox trade theorists probably see fewer cases that they would judge as justifying an activist policy than do members of the industrial policy school. One of the most provocative of Brander's conclusions is that the industrial policy literature contains "very little that is both inconsistent with economics and sufficiently clearly formulated to be specified as an alternative hypothesis." The differences between orthodox economists and the industrial policy school are, in Brander's view, "more a matter of style than of substance." This is a rather startling view, and I wonder how many of the industrial policy school would accept it. Brander goes on to qualify this view by adding:

> The real issues are ones of estimation: How important are externalities in the robotics industry? Is there substantial market failure in capital markets?....It is precise answers to questions like these that will lead to specific policy recommendations.

After reflection, however, I become less and less clear on the nature of the substantive point Brander is making. What does he mean when he refers to clearly formulated hypotheses that are inconsistent with economic theory? If the class is empty, at least of interesting examples, then the observation that a member of the class was not found is uninteresting. Since economists' categories are sufficiently broad to include most conceivable effects, the allegation that the industrial policy school can be brought within standard economics does not seem surprising to me.

Taking up Brander's suggestion that the differences are more of style than of substance, the following four classes of differences between the industrial policy school and orthodox economists occur to me as being explicit or implicit in the Workshop's deliberations. To call these all matters of style seems rather to stretch the meaning of that word.

- ***Real issues of magnitude.*** For example, how important are specific spillover effects?
- ***Real issues of behavior that can be handled in any economic model.***

For example, is it easy to remove capital-market imperfections and institutional rigidities through orthodox instruments of price incentives, or is the job more easily done by direct intervention with such instruments as quantity controls, subsidies, government exhortation, and so on?[20]

- ***Real issues of behavior that arise out of the new I.O.*** For example, do the profits and unexploited scale effects that are predicted by the theory persist long enough, and are they large enough, to be a valuable target for usurpation by interventionist economic policy?
- ***Real issues of behavior that arise out of the differences between the goods-are-goods and address branches of the new I.O.*** These surely are "differences of theory". The Workshop did not consider these but two have been mentioned above, and others are considered in my note on address models in this volume.

Together, these issues seem to me to run the whole gamut of economists' concerns from empirical magnitudes to theoretical differences of modeling and predictions.

How Can Governments Intervene?

Can government policy influence comparative advantage? All of the Workshop participants agreed that the answer is Yes. The simplest example, not mentioned at the Workshop, is where a policy that destroys industry X, which was a country's top export industry, changes the pattern of comparative advantage and brings new commodities into the range of successful exports. This is hardly a desirable policy, but it does illustrate two points. First, comparative advantage clearly can be changed by government policy; second, such changes are not always desirable.

Import Substitution versus Export Promotion

How governments can intervene raises the perennial debate over import substitution versus export promotion. Many countries have started with the former and gone to the latter. Opinion at the Workshop differed on whether the former was a useful policy, to be used at least in the earlier stages of development. Most participants felt that small and middle-sized, and even large, countries need sooner or later to switch over to an export-oriented policy if the full benefits of internal growth are to be achieved. Celso Martone suggested that Brazil's experience was relevant to this issue. It illustrates that, among other things, import substitution on too broad a scale sets up vested interests that then resist the shift to export orientation. Furthermore, in small or medium-sized economies, import substitution can create monopolistic industries. When their prices are controlled to prevent the exploitation of their monopoly positions, a serious nonmarket rigidity is introduced.

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[20] Tyson quotes Martin Weitzman ("Prices versus Quantities," *Review of Economic Studies* 41 [1974]: 477–491) in support of quantity rather than price targeting under conditions of planning uncertainty. In response, I reread Weitzman's article and agree that it does lend support to Tyson's argument at this point.

Commercial and Industrial Policies

There are two main groups of policy instruments for making interventions directed at the ends discussed in the previous section: commercial policy and industrial policy.

Commercial Policy

Commercial policy tools may be general or specific. A general tariff on all imports will favor the domestic production of nontraded and import-competing tradable goods; a specific tariff will favor specific sectors of production (but cannot favor specific activities such as R&D unless they happen to be used intensively by the protected industries). One use of tariff and nontariff barriers is to get an industry started that can eventually go on to sell worldwide — "today the domestic market, tomorrow the world!" At the Workshop, Paul Krugman reported an important example relating to the Japanese semiconductor industry.[21]

Industrial Policy

While most Workshop participants seemed to feel that they know a commercial policy when they see one, there was a lot of debate on just what was meant by an industrial policy. Geroski, for example, felt it important to narrow Brander's definition to distinguish industrial policy from competition policy, the latter seeking to free market forces and the former to channel them.

The discussion distinguished among several kinds of industrial policies:

- climate-style industrial policies, which seek to affect such broad forces as profit levels, risk taking, and savings;
- activity-specific policies, which seek to encourage specific activities such as R&D or education;
- industry-specific policies, which include not only such obvious policies as support of high-tech industries, but also support of agriculture

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[21] P.R. Krugman, "Market Access and International Competition: A Simulation Study of 16K Random Access Memories," NBER Working Paper no. 1936 (Cambridge, Mass.: National Bureau of Economic Research, June 1986).

and various declining industries; and
- firm-specific policies, which are common in small countries.

Climate-style policies. Brander gives an example of the first type of policy in his discussion of policies with respect to savings. He argues that more saving cannot always be assumed to be better than less saving, but that it nonetheless would seem likely that the U.S. savings rate is below optimum because of policy distortions that encourage spending.

Consideration of climate-creating policies raises a possibility that many participants took seriously: the success of the NICs, and even of Japan, might be explained by the creation of a general climate conducive to investment and risk taking, and uncluttered by restraints on profit-seeking behavior. In the extreme version of this view, specific industrial policies also followed by the NICs have done harm, but not enough to offset the good done by general climate-style policies. This is the extreme free-market case. Other countries are fettered with restrictions of all sorts, so when a few countries create an environment in which the market can work more or less freely, they call forth an enormous burst of energy and creative "animal spirits". Without necessarily embracing this view, it seems to me that the argument must be addressed by those who feel that sector-specific industrial policies can account for the success of the NICs.

Activity-specific policies. These kinds of policies may affect comparative advantage in the long term in ways that fit into the traditional Heckscher-Ohlin theory. For instance, if the decline of the U.S. education system is as serious as many observers feel, the resulting change in the stock of human capital, particularly at the middle levels of education, may have more influence on patterns of trade in the twenty-first century than the entire range of possible industry-specific policies.

Industry- and firm-specific policies. When one comes to these kinds of policies — the use of industrial policy, for example, to create comparative advantage at the micro level — one enters more controversial territory. No one at the Workshop had any doubt that industrial policy could influence the pattern of comparative advantage; that various government policies had tried to do so; and that the attempt had often succeeded in the past — for example, in the cases of the Japanese steel and shipbuilding industries.

Nonetheless, still unresolved was the question of how much of Japanese success was due to targeting that changed industrial activity from what it would have been under free-market determination, and how much was free-market determination showing through in spite of bureaucratic interference. Tyson says that Japanese policy "has been what might be called market conforming or market promotional....It has been designed to promote or accelerate the development of sectors deemed to be both privately and socially profitable." As Brander points out, this use of policy to "massage" market forces complicates the question posed above. Voltaire once remarked that incantations can destroy flocks of sheep, provided that they are accompanied by sufficient doses of arsenic. When industrial policy leans with the market, it is very hard to tell if the effect is to accelerate or to discourage changes that were going to take place in any case.

The Appropriate Level for Policy

There was discussion at the Workshop of the appropriate level for industrial policy intervention. Many participants felt that the level should be kept as high as possible, being general rather than specific; and where specific, the level should be sector- or industry- rather than firm-specific. For a small country, however, industrial policy is often necessarily firm-specific because many important sectors will contain only a few firms and sometimes one dominant firm.

Scott Fosler reported on a number of mainly climate-style industrial policies operated at the U.S. state level, as well as on others recommended by the Committee for Economic Development (CED). Three studies to be published by the CED in 1987 seemed of particular interest.[22] They will cover the following cases:

> Indiana, [which] built new institutions for developing economic strategy; Minnesota, [which] emphasized the quality of public services as a key to economic development; and Arizona, [which] consciously tried to shift from an economy that relied on natural resources to one that stressed high technology.

Many in the industrial policy group hold that industrial policy is best operated as a mix of different policies at different levels. Tyson, for example, says that "the Japanese government has used a host of interrelated policies, some aggregate, some industry-specific, some formal, some informal, to target certain industries and...these policies have had an enduring effect on Japanese trade patterns in specific sectors."

On the issue of general versus specific policies, Wontack Hong contrasted Hong Kong, with its creation of a favorable climate combined with *laissez-faire* at the micro level, and South Korea, with its relatively interventionist strategy. Clearly, there is no single royal road to success, and it is not easy to judge the relative merits of giving emphasis to one or the other of these approaches.

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[22] Committee for Economic Development, *Leadership for Dynamic State Economics* (Washington, D.C., forthcoming).

Hong also suggested an interaction between micro and macro industrial policies by arguing that not-dissimilar micro industrial policies in South Korea and Taiwan led to very different outcomes due to different macroeconomic backgrounds.

Pasçual Garcia suggested that the Mexican experience raises similar issues. A switch from import-substitution to export-promotion policies in the mid-1970s ran afoul of the macroeconomic policies of fixing the exchange rate and stimulating aggregate demand. Garcia also suggested that Mexico's current plight is more the result of poor macro policy responses to fluctuations in the price of oil than of poor, micro-level industrial policies.

Locating Potential Gains

Part of the question, How?, concerns locating the areas where there is a potential for successful policy intervention. Most participants argued that there were large informational requirements for governments to operate a targeted set of industrial and commercial policies with a reasonable chance of success. For example, policymakers need to know something about current and future world demand; about cost conditions, including the shape of the learning curve where applicable; about current and projected capacities in other countries; and about major spillover effects — at least where these play an important part in the justification for intervention. Although participants accepted that there are cases where the necessary information could be obtained, many were skeptical that this could be done in typical cases.

Skeptics, therefore, tended to support the traditional view of the market as providing the best way to decentralize the risks involved in picking winners. The new I.O., which recognizes that typical manufacturing industries produce hundreds, even thousands, of differential products, and that trade liberalization usually takes the form of intra-industry specialization, suggests that it may be very difficult to pick in advance the potential winners in any free, international competition. In pointing out, for example, that Canada seems to have an established competitive advantage in office furniture, a disadvantage in home furnishings, and an emerging advantage in seedless cucumbers, Whalley is wondering implicitly how a conscious policy of picking winners could have selected these particular ones. In such industries, the case for leaving decisions to the market, where privately ventured capital does the experimenting, seems strong.

This skepticism must be set against the view of the industrial policy school that entire industries are desirable and need to be fostered if they are to prosper. For example, not just seedless cucumbers but all of agriculture might be subject to an industrial policy, but one that was compatible with letting the market choose whether seedless cucumbers or lettuce was to be the "growth" product. As another example, computers in general might be singled out for such treatment as a strategic industry with large spillover effects, while leaving the market to sort out the winners from the losers among particular firms and specific products.

The Possibility of Retaliation

In small countries, a key limitation on the use of trade-directed, strategic industrial and commercial policies is the possibility of triggering reactions from one's trading partners. The Canadian case may be used for illustration at this point. Recently, Canadian nationalists have been advocating an inward-looking industrial and commercial policy that seeks to encourage Canadian production for the Canadian market — that is, import substitution sometimes combined with export promotion. Such a policy is particularly dangerous at this time. As Lipsey and Smith observed some time ago:

> The initial stage of the inward-looking plan calls for increased barriers to trade with the United States. This action invites serious U.S. retaliation. Given the current protectionist sentiments in the U.S. Congress, few will doubt that this invitation would be accepted.[23]

Instruments

Paul Geroski stresses the issue of choosing appropriate detailed instruments for active policy intervention. He suggests that one of the most powerful instruments is procurement policy, particularly for encouraging R&D, while subsidization is one of the least effective. Full evidence is not yet available, however, on the relative merits of European procurement policies that favor existing national champions and U.S. policies that favor small firms. Geroski also considers public-sector job-creation schemes and reports that, in the United Kingdom, they are very costly per job created. He states that private-sector schemes, introduced by firms forced to make large-scale redundancies, seem to create jobs at a cost that can be a whole order of magnitude lower than the best the public sector seems able to do.

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[23] R.G. Lipsey and M.G. Smith, *Taking the Initiative: Canada's Trade Options in a Turbulent World*, Observation no. 27 (Toronto: C.D. Howe Institute, 1985), p. 60.

Should Governments Intervene?

Two of the hardest questions to answer are: Should governments intervene? If so, under what circumstances?

Avoid Fads

The world is full of myths, and policymakers clearly embrace many of them. A standard one of 30 years ago is that a country cannot be modern and prosperous unless it has a steel industry. But although some countries, such as South Korea, developed prosperous steel industries, others languished in underdevelopment in spite of the costly construction of such an industry, while yet others prospered without a steel industry.

The steel example, which, like the lessons of history, is so obvious when seen in hindsight and so difficult to recognize when dressed up in modern attire, is a cautionary tale. Is high technology the modern equivalent? Unfortunately, no one can know for sure — which is why the stock market remains an uncertain investment. Collective myths sometimes have dominated policy in the past, and no doubt they sometimes will do so in the future. So those interested in rational decisionmaking need to check that this is not what is driving some policy they endorse today.

Economists' Intuitive Reactions

As Whalley points out, most North American economists have an intuitive reaction against interventionist policies. They tend to be free traders internationally and free marketers domestically. Another intuitive reaction to which many Workshop participants alluded was a fear that governments would get it wrong in practice, whatever the theoretical possibilities that perfect intervention could be beneficial. I must confess to being more attracted to the argument based on political economy than to impressions based on current economic theory.

Institutional Conditions for Success

The above allusion to issues of political economy suggests a possibility that is worthy of further research and that was suggested by comments several participants — including, of course, Brander — made about different international experiences of actual industrial policy.

It is possible that varying international performance in industrial strategy is to be accounted for more by national differences in bureaucracies and institutions for decisionmaking than by differences in the problems addressed. Compared with the United States and Canada, such countries as France, West Germany, and Japan are alleged by some to have higher-quality civil servants who, to some extent, are independent from day-to-day political influences and so are able to identify, and are free to pursue, a moderately consistent set of potentially successful policies.

Two key elements of any successful strategy designed to shape comparative advantage are that it be consistent and that, in Tyson's words, it be "market conforming," which I take to mean that it should seek to influence either what is more or less going to happen anyway or, at least, what can be sustained by the market if it is first made to happen. In short, it should flow with, not against, economic realities. This is what some outsiders feel some European and Japanese industrial strategies often do, in contrast with what happens in many other countries.

Koichi Hamada, however, downplayed the consistency that many outsiders see in Japanese industrial policy. He saw it, rather, as a collection of more or less independent policies not following from a coherent, well-developed plan.

Whatever we make of such conjectures and generalizations, there is clearly a rich field here for comparative studies to investigate the view that major contributors to national differences in the success of growth-oriented industrial and commercial policies are national differences in bureaucracies, in decisionmaking institutions, and in the ability to reconcile such conflicting policies as the maximization of the national growth rate and the reduction of regional inequalities.

Cost-Benefit Analysis

When one comes to investigate the question, Should?, in particular cases, there is no substitute for specific measurements. The task is easier with sector-specific than with activity-specific policies. An example of a sector-specific study is Paul Krugman's study of the Japanese semiconductor industry. Roughly, his conclusions are that the policy worked to establish the industry, but that the losses exceeded the benefits.

The problem with such studies is their inability to catch spillover effects. As long as general spillover and climate-creating forces are a major part of the motivation for industrial policies, narrowly focused measurements such as Krugman's will not settle the issue. They do, however, make a very good start by showing us how large the net benefits from spillover effects would have to be to offset tne direct loss in the market concerned.

On activity-specific policies such as R&D promotion, or climate-creating ones such as education, the task is even more difficult, since all of the benefits are diffused throughout the economy. Nonetheless, measurement is not impossible, as studies of the social rate of return to investment in education show us.

Research Possibilities

All of the Workshop participants agreed that many issues needed research. Some of these were grand themes and some were simple tunes. Even the grand themes are worth replaying here because researchers will be able to find some manageable tunes from within them. I have tried to avoid excessive generality, but specifying many of the research topics here mentioned in single sentences would require much preparatory work and careful exposition.

Most of the research suggestions are mixtures of both grand themes and lesser tunes and many call for both theoretical and empirical work. I have chosen, therefore, to divide the material in neither of these ways. Instead, I make a major division between general studies and case studies, particularly of a comparative sort. I arrange the general topics according to the order in which they arose in the section on reasons for policy intervention. The first issue concerns the nature and scope of the debate; this then leads to general issues of the determinants of comparative advantage. After that comes the broad issue of spillovers, followed by the specific examples of linkages and R&D. After a brief discussion of the issue of the optimal unit for intervention comes the wider topic of supernormal profits and strategic behavior. The suggestions for case studies are more diffuse. They more or less follow the same order, but they also include some applied aspects of the earlier topics that have not been mentioned explicitly earlier in this Report.

General Issues

What Is at Issue in the Debate?

Brander's contention that the differences between the industrial policy school and orthodox economists are more a matter of style than of substance inspired much debate. One of the big problems with the lack of theoretical rigor that characterizes much of the industrial policy literature is the resulting difficulty of discovering what really is at issue between these writers and the more orthodox economists. A great contribution to the debate would be made if someone would (i) lay out every identifiable qualitative difference in assumptions and inferences; (ii) lay out every difference on assumed magnitudes where qualitative relations are assumed to be the same; and (iii) challenge members of the industrial policy school who feel that the resulting list is an inadequate description of their differences from orthodox economists to articulate the missing differences. This material could then be the subject of a workshop.

One Workshop participant responded to this suggestion with the comment: "Ho hum, another piece of scholastic definition chasing." That is not the way I see it. Without some such exercise as I have just suggested, the protagonists in the debate are likely to waste much of their time — except where the right answers have been revealed to them, and they see their main task as influencing governments to follow the already-known correct path. For people who are interested in getting closer to the truth, heated debates over differences that are not fully understood are very likely to be sterile and thus are to be avoided whenever possible — hence, my suggestion.

Which Issues Are Essentially International and Which Essentially Domestic?

An important general research topic is to sort out which of the issues discussed at the Workshop would exist in a closed economy and which arise mainly because the economy is open. It is important to separate issues that are essentially trade related from those that merely appear to be, because policy discussions often confuse issues whose causes and cures are mainly domestic with those whose causes and cures are trade related.

For example, I have argued that much of the concern about loss of competitiveness is related to a loss of absolute advantage due to a low national rate of productivity growth (or to an overvalued exchange rate). The resulting reduction in relative living standards may be a cause for concern, but trading relations are not a basic cause. Any tendency for the current account to fall into deficit as a result of this loss of absolute advantage will be corrected by a shift in the exchange rate. This is not hard to see in the case where productivity growth is x in all of one country's industries and y (>x) in those of all other countries. But if these overall rates of productivity growth are combined with rates that differ across industries and across countries, the situation may not be so clear to observers. Both comparative and absolute advantage will now be changing. The country with the lower overall growth rate may see the problem as one of loss of comparative advantage in its traditional export industries. But the changing pattern of comparative advantage may have nothing to do with the decline in that country's relative living standards, which is solely due to its lower overall rate of productivity growth. If so, a commercial and industrial policy aimed at redirecting investment toward the traditional export industries may be counterproductive.

For a second example, much of the discussion on managing growth and decline concerns issues that would arise in a closed but growing economy. Are the issues different, and are the upsets greater, when the domestic adjustment is imposed by shifting demand and cost patterns caused by growth abroad rather than by growth at home? Are the appropriate policies to manage the adjustments different in these two cases? Or is it merely that governments react to different political pressures when faced with adjustment arising from domestic and from foreign causes?

Is the Factor Endowment Theory Obsolete?

A fundamental tenet of the industrial policy literature is that many industries are footloose, having no natural homes as indicated by comparative advantage based on factor endowment. Leamer's work suggests that the standard theory cannot be so easily dismissed.

One of the many issues raised by such debates concerns the importance of human capital acquired during formal and on-the-job training. How much does a country's comparative advantage depend in the modern world on the quantity and quality of human capital? To the extent that acquired human capital remains a major determinant of the types of comparative advantage that still influence trade, a climate-style industrial policy has great potential. It seems quite possible that changes in the stock of human capital over several decades could be more important than anything that is done directly to favor or retard particular firms or industries. This is a very important issue, on which much has been done. Further work is still needed, however — work that focuses on how alternative policies could influence comparative advantage in desirable ways in future. Such policies appeal to orthodox economists because they seek to raise living standards by proven routes that work through the acquisition of human capital, while leaving the market free to determine the most profitable uses of that capital.

Strategic Industries and Spillover Effects

Tyson calls for theoretical work to broaden the notion of externalities so as to capture the idea of spillovers. Such work would be extremely useful in helping to clarify some of what is at issue in the debate. I for one am uncertain about the distinction between externalities and spillovers, and I wonder if it is too optimistic to hope that someone who understands the difference could model it for us, even if in simplified form.

Tyson also calls for work to measure the effects of policies across groups of sectors or across the whole economy, not just the narrow slots in which they are instituted. The idea is to measure the broader concept of spillovers, rather than the narrower concept of externalities.

The problem with tackling head on such grand issues as the significance and magnitude of spillover effects is that really hard evidence is difficult to come by. As a result, those who believe spillovers are large and important can go on doing so, those who believe they are small and unimportant for practical policy can go on doing so, while those who do not know but would like to will be left in that state.

All of this suggests that some approach other than a head-on attempt at full measurement might be fruitful. One such approach is discussed, purely by way of illustration, in the section on case studies in this paper.

Tightly Linked Goods and Services

One example that might be thought of as a spillover effect concerns the linking of some services with related goods. Tyson refers to many services being "tightly linked" to manufacturing products so that "competitive difficulties in these activities are likely to cause competitive difficulties in related services" and cites a forthcoming book by Cohen and Zysman. She states that these products form an "interrelated system" and "it is hard to imagine how a competitive erosion in product lines in world markets would not spill over into an erosion in related services."

The Cohen and Zysman book is unlikely to be the last word on this interesting subject and no doubt will suggest further research at the level of particular goods and services. For example, are there exceptions to the rule that certain services do not prosper unless produced along with their "closely related" manufactured commodity? What does "produced along with" amount to? It certainly does not mean within the same firm, according to the examples Tyson quotes. Is it within the same town, geographic area, or merely the same country? If the unit is a large country, what gives the producers of the closely related service in another part of the country a critical advantage over producers in another country, even though both may be the same geographic distance away from the seat of production of their closely related good? Suggested answers to these questions could become hypotheses to be tested in respect to certain services and goods in various countries.

Research and Development

Many hold R&D to confer major spillovers onto the rest of the economy in general and the rapidly growing sectors in particular. Checking on this view through hard research is no easy matter.

In Canada, for example, years of research and heated debate on this issue seem to have done little to settle the matter. Those who are attracted to such policies continue to favor them, while those who are skeptical continue to express doubt. That particular example suggests once again that when grand issues are tackled on a broad front, hard results that are convincing to those with open minds may be hard to come by. Once again, case studies may offer some alternative routes.

The Optimal Unit for Intervention

There was much discussion at the Workshop of the optimal unit on which to focus industrial and commercial policy. Is it the firm, the industry, some grouping of industries, some specific activity, the economy as a whole, or some other unit? There may be room for some general theorizing on that issue. It also might be possible to learn something from case studies that could take account of specific differences between the units in the case of individual products and activities.

The Optimal Instruments for Intervention

It is clear that there is room for a vast amount of work on alternative instruments for achieving interventionist ends. At this point, I cannot do better than to quote Dixit's excellent exhortation.

> Studies of the political economy of trade policy show that the mechanism favors the concentrated special-interest groups in established industries, and ignores the dispersed groups of consumers and new emerging industries. This is very damaging to the general interest and can harm everyone in the longer run. It is of the utmost importance that normative research should focus on the design of a policymaking process that is less susceptible to exploitation by such special-interest groups. In the meantime economists can perform a useful service to the community by acting as forceful advocates of the general interest.[24]

Supernormal Profits and Strategic Behavior

Many aspects of the use of strategic behavior to preempt supernormal profits need urgent study — as is already well understood by economists working in both the new I.O. and new trade theories.

How large and persistent are supernormal profits? The particular way in which this research is conceived will depend on whether its theoretical underpinnings come from models based on the goods-are-goods or the address approach. Dixit, for example, uses concentration ratios to suggest — in what is admittedly only a general survey of research issues — that supernormal profits are likely to be less widespread than is sometimes thought.[25] It is an explicit prediction of address models that there is no necessary correlation between the existence of supernormal profits and the number of firms or products in any industry. Others use models based on modern formalizations of Chamberlin's famous symmetry assumption where, in effect, each differentiated commodity is an equally good substitute for every other differentiated commodity produced within an industry. This assumption, which amounts to saying that there are no close and distant substitutes, was long ago assailed by Kaldor and recently has been assessed critically, in of its many modern guises, by Eaton and Lipsey (see footnote 2).

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[24] Dixit, "Trade Policy on Agenda for Research," p. 302.

[25] Ibid., pp. 290–292.

Insofar as such profits do exist, the policies designed to capture them need study. At the highly theoretical level, more work is needed on the structure of the strategic games being played.

Much of the work of strategic trade policy uses what can be called "two-corner" games — games played between two governments — or "three-corner" games — games played among a domestic set of firms, the domestic government, and a foreign government. Two-corner games assume that no strategic gaming goes on between governments and their own firms. Three-corner games allow interaction between domestic firms and governments, but face them with a homogenous foreign entity.

Murray Smith emphasized the need for further theoretical work on the more realistic case of "four-corner" games — games with both firms and governments located at home and abroad. Four-corner games allow for interactions between governments and firms with some, but different, overlaps of self-interest between each of the various groups. For example, the two governments may worry about precedents their behavior will set for other governments; the two sets of firms may have similar interests in reducing government interference through, say, international pollution-control agreements; the domestic firms and the domestic governments may have a common interest in shifting profitable operations from foreign firms and countries to domestic firms and countries. Smith suggested a number of topics for study within this framework, involving an analysis of the conditions that might influence the outcomes of those "four-cornered" strategic interactions. When might the rules and procedures for trade negotiations provide a form of "commitment" that enables the parties to reach mutually advantageous first best outcomes? When will there be incentives for the home country and firm(s) to engage in collusive actions to the detriment of trading partners that may lead to trade wars? Since the profit-shifting hypothesis suggests that small countries may have optimal tariffs on differentiated products, how will this affect strategic interaction between big and small countries?

At a more general level, Dixit's advice is important:

> Even in industries where profit shifting *is shown to be important*, trade policies can only be justified if no other superior policies are feasible. The study of such a hierarchy of policies, analogous to that available for the case of perfect competition, is an important task for theoretical research.[26]

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[26] Ibid., p. 301.

Brander, after some disagreement with Geroski, argues that in spite of existing work, much more research is needed on "the behavioral parameters that reflect how rivals react" and, hence, how their reactions will support or erode profits.

Dynamic Considerations

As part of the study of the dynamics of profit creation and maintenance, Geroski calls for research on the dynamic issues that Brander outlines. How fast does entry occur? Where it is both potentially profitable and possible? Why do innovations often diffuse slowly? Is entry a very costly method of market adjustment?

The previous paragraph raises some issues of dynamic adjustment. For example, what determines the rate of diffusion of new innovations throughout a country? What role do intellectual property rights — which clearly are a creation of government policy — play in this process? Is the optimal rate of diffusion from the country's point of view the optimal rate from the world's point of view? (The idea here is that it might pay the country to grant long patent periods, which, while slowing down the rate of diffusion through the rest of the country, also slow down the rate at which the innovation is copied abroad.)

Case Studies

Workshop participants were concerned that all too many case studies are inconclusive. Many felt that although such studies could yield valuable background information, they would be unreliable as tests of any contentious issue. Geroski argues vigorously that the failure lies not in the comparative case-study approach *per se* but in the lack of focus of so many actual case studies.

Methodology

How should case studies be conducted? Brander calls for carrying out "such investigations with a level of rigor at least approaching that of formal econometrics." Geroski notes that a small number of countries have tried a small number of policies on a small number of sectors and that to learn from these, small-sample techniques are necessary. In Geroski's view, "the drawback of case studies is lack of perspective, rather than lack of rigor, and...this can be corrected by carefully structured comparative studies."

The world is complex enough that if one conducts a case study looking for data that confirms some pet theory, one is unlikely to fail — provided only that one looks long and hard enough. For example, anyone who looks for spillover effects from rapidly growing industry y in newly industrializing country x is almost certain to find them.

Case studies that go beyond the descriptive need to be designed in the light of good Popperian methodology.[27] Some theory or generalization needs to be specified, and the observations that would conflict with the theory, or refute the generalization, need to be stated in advance. A single significant exception, after all, is sufficient to refute a generalization. When one such exception is established, the natural next step is to inquire whether this is one of many exceptions or the rare exception that proves the rule. Dealing with these questions will further advance knowledge.

All too often, economists fail to follow the good scientific advice of stating in advance what observations would conflict with the theory being considered and then trying hard to find such conflicting evidence. Instead, they often look for bits of confirming evidence, or else collect evidence and then argue after the fact whether it is in conflict with some theory.

The moral is that any theory for which no conflicting evidence can be specified is an empty theory, and any case study conducted in a situation in which no conceivable finding would be in conflict with the theory under consideration is irrelevant. So, what is needed, if one wants to use case studies to test theories, are studies where one can specify in advance some conceivable findings that would be embarrassing to, or in conflict with, the theory in question.

Using that general methodology, one can do comparative case studies of specific policies. If, for example, the theory states "such and such is always an effective policy", then one must look for places in which the policy failed. If the theory states "such and such is an effective policy under the set of conditions, S", then one must look for success when S was not present or for failure when S was present.

Another type of comparative study takes some condition, x, that is hypothesized as being necessary for some result, y, to occur. The study then looks for cases where y occurred without x.

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[27] The great twentieth-century philosopher of science, Karl Popper, made potential refutability the criterion for a statement to be scientific. If a theory is to be scientific, it must be possible to conceive of evidence that would, if substantiated, refute that theory. A theory for which no conflicting evidence can be imagined is empty in the sense that it is consistent with any state of the universe. Post-Popperian philosophy has gone beyond Popper's advances, but his critical insight remains: any theory is empty if evidence that would conflict with its predictions cannot be specified. Two conclusions related to the discussion in the text follow from what has just been said. First, a study related to some theory that does not have the potential to produce conflicting evidence is irrelevant as a test of that theory. Second, if one conducts a study without specifying in advance what conflicting evidence conceivably could be found, one does not know if one is doing anything relevant to test the theory.

Still another type of case study seeks to test the hypothesis that certain policies have had a significant effect on trade flows. Such studies, however, need a counterfactual benchmark. In certain cases, this can be provided by the type of formulation of the Hecksher-Ohlin model made by Leamer. One way to assess the impact of interventionist policies on trade flows is to see if those policies can explain (with the right sign) the residual of trade flows not already explicable by resource endowments using, for example, Leamer's methodology.

Every scientific observation can be thought of as a case study. If scientists can test their theories against observations, then economists can test their theories against case studies. The trick is to have a theory sufficiently well specified that one knows when one has found conflicting evidence.

What follows is an illustrative list of some of the possible case studies that seem to be potentially informative. It would not be too difficult, however, to conceive of case studies under each of the headings used in the previous section.

Managing Change

Workshop participants suggested a host of areas for comparative case studies under this general heading. Some would be in the information-gathering category, while others would be designed as tests of specific hypotheses.

Geroski thought that much could be learned by studying industries subject to a high degree of turbulence. Whalley suggested following up on the aftermath of investment incentive wars. There are some suggestions in the literature that firms that are persuaded by policy inducements to go where they otherwise would not have gone (or possibly to do what they otherwise would not have done) are among the first to fail when international demand falls or international competition heats up. Policies that are successful at the set-up stage of new firms or products might prove failures if judged over the life cycles of these activities. Case studies that follow specific firms or investment incentive policies beyond the inducement period could provide much useful information. They also could be used to test the hypothesis that the success rate of policies is significantly lower when judged over the life cycle than when judged by their impact effect.

The evidence suggests that whatever advice economists give, governments will intervene from time to time to save jobs. Sometimes commercial policy is used and sometimes industrial policy; sometimes the attempt is only to slow down the rate of contraction, while at other times the attempt is to maintain the present level of employment.

Given that such attempts are commonly made, empirical research could be directed at better and worse ways of doing the job. Comparative studies could be made of methods of protecting employment in various troubled industries, such as steel, across several advanced industrial countries.

Spillovers and Externalities

The difficult problem of getting some sort of handle on spillovers might well be approached through case studies. Take a number of industries alleged to have critical spillovers in Japan or some of the NICs, and study these same industries elsewhere. Tyson, for example, cites steel and shipbuilding as having had important spillover effects in Japan's earlier, postwar economic development. The United Kingdom had both of these industries and spent much public money on subsidies and modernization schemes in an attempt to keep them. It largely failed with shipbuilding but succeeded, at least partially, with steel. Why did these industries work wonders for Japan and not for the United Kingdom? Is it not possible that any new, growing manufacturing industry in Japan would have had the same effects? In a country in which manufacturing is growing, so the infrastructure will be developing, as well as the network for importing needed raw materials. Whatever industries grew might then have seemed responsible for the spillovers. In this view, the search for the strategic industry that is different from those the price system would cast up, one that will maximize spillovers, is a search for a mythical entity.

Some important information relating to these views would be gained by studying (i) the performance in other countries (as suggested above) of industries alleged to be strategic in producing spillovers in one country; and (ii) industries alleged to be strategic in this sense in several of the countries that have grown rapidly in recent decades — if each country has a different set of strategic industries, the search for the typical characteristics of such industries to help other countries trying to grow may become suspect. If the set is similar, the characteristics that make a strategic industry might be isolated.

At the pure measurement level, alleged spillover effects present problems as perplexing as at the theoretical level. The more carefully defined and the more specific any hypothesis is, the more likely it is to leave out potential spillover effects. I have no general panacea to offer. All I can say is that, without carefully specified hypotheses, comparative case studies cannot get beyond the (important) stage of generating merely suggestive data; with carefully specified, specific hypotheses, there is the danger of focusing on the specific and missing the generalized effects. This is not decisive. Generalized effects can be looked for, and the likely conditions for them to be large or small can be isolated.

External economies are at least a part of spillover effects. Wontack Hong suggested that work might be undertaken in the context of a case-study comparison of Hong Kong and South Korea. He noted that Hong Kong's export-oriented growth, based on a *laissez-faire* system, probably relates to its long experience as an entrepôt and to its extreme scarcity of land, which has exaggerated its comparative advantage in labor-intensive production. Hong Kong exports only those labor-intensive goods that can be produced without significant external economies. South Korea's export-oriented growth, on the other hand, has been related to extensive government intervention. The suggested implication of such a comparison is that the resulting differences in economic activity come from external economies. Comparative case studies could well throw light on these issues.

Tight Linkages

The linking of services jobs to manufacturing jobs might be tested with comparative case studies. Form a hypothesis about the linking of a series of services jobs in the set x to a series of manufacturing jobs in the set y, a hypothesis that is consistent with what is observed in one country. This is the point at which a good story about such linkages can be told. Now look for a refutation arising from the experience of other countries by looking for the existence of elements in the set x in the absence of elements in the set y.

Research and Development

As already mentioned, debates about the value of general support for R&D in individual countries are hard to settle, in spite of a large body of research on R&D in various countries. This leaves one wondering if anything more could be learned from comparative case studies where countries with different R&D policies are compared, and where changes in R&D policies in each country are studied to see if major responses can be detected. No clear test of so general a hypothesis will be possible from such studies — any more than they have been possible from studies of individual countries. But comparative case studies covering alternative science policies are, at least, a control against generalizations made from a single observation and, at best, useful in suggesting hypotheses about such policies.

The Optimal Unit for Intervention

Geroski points out that evidence is not yet fully in on alternative methods of support, particularly comparing the United States and countries of the European Community. Some excellent case studies of failures of government intervention to assist particular firms or projects have been written.[28] Although these do not test any theories, they add to knowledge about the nature of the failures and may provide part of the empirical input into some theorizing about the characteristics of situations that are likely to lead to failures. Before such theorizing can go far, the other half of the raw material would seem to be case studies of successes. A comparison of case studies of successes and failures across several countries — for example, were the characteristics similar or substantially different in the various countries? — could suggest hypotheses about the characteristics that influence the outcome of particular interventions.

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[28] See, for example, S.F. Borins and L. Brown, *Investments in Failure* (Toronto: Methuen, 1986).

Conditions for Satisfactory Decisions

Many Workshop participants spoke of the large amounts of information governments need before being able to operate a targeted industrial policy with a high chance of success. A research program on this topic would include a careful investigation of informational requirements in some of the typical cases in which industrial or commercial policies are, or might be, applied. This would be mainly descriptive, although nonetheless interesting. It might be possible to identify cases where more or less snap decisions were taken, to see if the success rate is significantly worse than when long and careful research is undertaken.

Participants conjectured important determinants of national variations in policy success to be national conditions concerning bureaucratic decisiontaking, political interference with policies designed to promote economic ends, and resolution of policy conflicts. Comparative studies of otherwise similar growth-oriented industrial and commercial policies could be made across several countries that differed in these political economy dimensions. This is the sort of interdisciplinary study, requiring input from political scientists and economists, that is often attractive to fund-granting bodies.

The Policy Mix

Many think the background policy mix that has underlain particular outcomes in economic performance to be important. This could be a subject for inter-country case studies. Wontack Hong pointed out, for example, that both Taiwan and South Korea have employed such policy measures as administrative support; preferential tax treatment; allocation of subsidies, including subsidized credit rationing; and reduction of import substitution biases in the economy. Yet, he noted, South Korea has experienced not only strong economic growth, but also higher inflation, a worsening distribution of income, an accumulating foreign debt, a concentration of economic power, and nonperforming loans and business failures. These characteristics contrast markedly with Taiwan, which has experienced low inflation, an improved income distribution, a current account surplus, a proliferation of small business, no large business failures, and a financial regime that encourages saving (positive real interest rates compared with negative interest rates in South Korea).

Another important issue concerns the relationship between antimonopoly policy and interventionist trade and industrial policy, as several participants, including Richardson, emphasized. The policy of pushing chosen firms, or of encouraging inter-firm or inter-industry coordination in order to get agglomeration effects, is likely to reduce competition. A host of evidence from various countries and policy interventions shows that government-encouraged cooperation seldom stops at the areas of government concern. The relative importance of encouraging competition and letting the market then work more or less unhindered, or of intervening with active policies at the cost of some loss of competition, is very hard to judge as a grand issue. But case studies of what has happened in different countries that took opposite paths with respect to similar industries might be revealing.

Topics Related to the New I.O and Trade Theories

Everyone in these fields is aware of the need to check empirically on some of the key assumptions and predictions. How widespread and persistent are supernormal profits? How effectively is entry blockaded by the types of entry barriers studied? Does Schumpeterian creative destruction not operate over a longer period to reduce or even eliminate pure profits when these are properly evaluated over the life cycle of such firms and products? How important are the irreversibilities and discontinuities that are predicted especially from address models? Work is being done now on many of these issues.

One aspect of these issues may be of particular importance to what was discussed at the Workshop. This relates to the sudden shifts and irreversibilities that are a part of the new I.O. and trade theories. In situations characterized by large amounts of sunk physical capital, costly process or product development, and brand-image advertising, it is easier to lose a position than to regain it. In the simplest form, if country A loses its position in a market where there is room for the industries of three countries and is replaced by country B (countries C and D remain in the market), it then may be virtually impossible for A to get that market back.

This suggests, among other things, that getting macroeconomic policy right, more or less continuously, may be more important than anything done, one way or the other, at the microeconomic level. If a country adopts ill-advised macro policies that cause its exchange rate to be overvalued for five years, the resulting loss of markets may take 20 years to make up. Testing for irreversibilities may be possible in case studies of otherwise similar countries with differing temporary bouts of poor macro policies.

Conclusion

Policymakers are always attracted to interventionist industrial and commercial policies. The growing concern in the industrial countries about economic change in general, and apparent loss of competitiveness in particular, is magnifying the appeal of such policies. The industrial policy school holds that the concern is well founded and that the correct reaction is to adopt better, more coordinated, interventionist policies.

At the level of climate-style policies, most economists agree that government policies that influence education, risk taking, investment, the balance of preferences between income and capital gains, net and gross international capital flows, union membership, and a list of other key forces exist and have important effects. Since no one can design a practically workable neutral tax system, such policy incentives are an inevitable byproduct of government. Most economists also would agree that there is scope for improving the efficiency of such policies. Disagreements are then over the technical matters of which policies should be changed and by how much.

More fundamental disagreements arise over activist strategies at the micro level designed to alter trading patterns and differentially affect investment and growth. There are no simple answers to great issues such as these. Moreover, people with heavy investments of intellectual capital in one position or another usually are reluctant to recant. But researchers do chip away at the issues and, as the mass of knowledge accumulates, the balance of informed opinion does change. We hope that the Workshop, and the research that follows from it, will play some small but helpful part in this process.

Faced with such divergent grand views as those that separate the protagonists in this debate, and knowing how important the policy implications are, the economics profession's normal instinct is the right one: to work as hard as possible at clarifying the issues, at theorizing about them, and at increasing the amount of data that provides both useful descriptions and observations to test hypotheses.

Models Matter when Discussing Competitiveness: A Technical Note

Richard G. Lipsey

In this paper, I discuss the two types of models found in the new theories of industrial organization (I.O.) that Archibald, Eaton, and Lipsey have called address models and nonaddress, or goods-are-goods, models.[1] I argue that these two types of models make one alert to somewhat different possibilities, so that intuitions honed on one type of model are likely to differ from intuitions honed on the other. In particular, nonaddress models tend to display continuity while address models tend to display discontinuities. In nonaddress models, small changes that affect trade tend to have small effects on trade and can be offset by small changes in exchange rates. In address models, on the other hand, small changes can have large effects that cannot necessarily be offset by small changes in exchange rates.

Because of these properties, it seems to me that the theoretical underpinnings of those who worry about loss of competitiveness really should be grounded in address models rather than in nonaddress models. Nothing in what follows, however, is to be taken as arguing on one side or the other of the great debate about loss of competitiveness. All that I am trying to do here is to suggest a theoretical setting that may capture what is at issue better than the one used almost exclusively so far.[2]

Because space is limited, I will rely on arguments that are both intuitive and condensed.

General Assumptions

I wish to concentrate on the effects of changes in competitiveness on real incomes. To this end, I make two assumptions. First, I rule out exchange-rate changes caused by changes in capital flows by assuming net capital flows are zero. Second, I rule out changes in the real terms of trade caused by effects emanating from current account transactions by assuming that I am dealing with a small country, A, that is powerless to affect the prices charged by producers in other countries (except by provoking discretionary retaliatory reactions from them).[3]

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[1] G.C. Archibald, B.C. Eaton, and R.G. Lipsey, "Address Models of Value Theory," in J.E. Stiglitz and G.F. Mathewson, eds., *New Developments in the Analysis of Market Structure* (Cambridge, Mass.: MIT Press, 1986), pp. 3–47.

[2] I do not claim that the two types inevitably give rise to different results (although I suspect they do), because no one can ever be sure what an ingenious theorist will be able to do with one model to allow it to handle those issues that another model was explicitly constructed to handle.

Nonaddress, or Goods-are-Goods, Models

Consider first the standard models of value theory that are also used in trade models. From my point of view, the key aspect of such models is that the set of all possible goods is a finite, or countably infinite, set of distinct items. The set is given at the outset of any study, and the derivation of the characteristics of each item in the set is unexplained. Thus, the basic atom from which the analysis begins is the given list of goods, each distinct from all others; hence, the appellation, "goods-are-goods models". In order to make each good in the set a possible candidate for production, consumers must have tastes that are defined over these goods and that allow positive amounts of each good to be sold over some range of positive prices.

As long as one is dealing with interior solutions, goods-are-goods models normally display continuity. Changes occur smoothly and continuously; there are no sharp discontinuities or disaster points.

The Competitiveness Debate in Nonaddress Models

A key use of such a model is in Robert Lawrence's book *Can America Compete?*,[4] which Thurow critically discusses in chapter 4 of his *Zero-Sum Solution*.[5] The important result these authors discuss is that a loss of competitiveness in country A, due to slow productivity growth or anything else that raises A's costs relative to costs in the rest of the world, can be offset by a suitable change in the exchange rate.

To isolate the point under discussion, one first needs some assumptions.

- Country A is producing and exporting commodity Q, producing and importing commodity R, and producing the nontraded good S.
- Productivity in all industries is growing at the rate of x percent in the rest of the world. All products have unit income elasticities of demand so that the terms of trade do not change as a result of this economic growth.

Now reason as follows.

If country A's actual productivity in Q, R, and S also grows at x percent, its volumes of exports and imports, and its real income, also will grow at that rate.

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[3] When it comes to address models, one has to be careful how one states the small-country assumption.

[4] R. Lawrence, *Can America Compete?* (Washington, D.C.: Brookings Institution, 1984).

[5] L.C. Thurow, *The Zero-Sum Solution* (New York: Simon and Schuster, 1985).

If country A's productivity in all lines of production grows at y percent, which is less than x, its real income will grow at y percent. Its gap in income compared with the rest of the world then will grow at approximately x − y percent. There are two ways in which this may work out.

- If money wages are productivity geared in each country, then wages in country A will rise only by y percent and the exchange rate, and all prices, then will remain constant. A's real income, and its consumption of domestic and imported products, will grow at the same rate as money income — that is, by y percent.
- If country A's money wages rise at the same rate as money wages in the rest of the world — say, x percent — then the external value of A's currency will have to depreciate by approximately x − y percent. In this case, although A's money wages rise by x percent, the rise in all import prices will leave A's real income, and its consumption of domestic and imported products, rising by only y percent.

Now let all growth rates in all countries be y except for industry R in country A, whose growth rate is $z > y$. A's real income now will grow at the production-weighted average of y and z. Furthermore, A will begin to produce more and more R, and sooner or later will switch to importing Q and exporting R. Because of the existence of trade, A can produce more R and hence get the advantage of a higher average growth rate than if it only produced the R that it needed at home. Although A loses comparative advantage in its traditional export industries, this is no cause for concern; A is better off by virtue of the shift in comparative advantage.

A slightly different case arises if the one departure from the universal growth rate of y is in A's industry producing Q, where productivity is now assumed to grow at $x < y$. Now A's growth rate is less than the rate in the rest of the world. As in the previous case, A's comparative advantage gradually changes until it comes to export R and import Q. The existence of trade, and the shift of comparative advantage toward R, allows A to reduce the unfavorable effects of the slower growth rate of Q. As relative productivity falls more and more in that industry, less and less Q will be produced and more and more R will be exported in return for imports of Q. In the limit, no Q may be produced in A, in which case A's rate of growth of real income will have once again reached the rate achieved in the rest of the world (y).

The two key conclusions are:

- A's growth of living standards is determined by its domestic rate of productivity growth;
- trade allows A to mitigate the retarding effects of a slow rate of growth in some industry, provided that industry produces a traded good.

The above theorizing lies at the basis of the orthodox economists' view that downgrades much of the concern about international competitiveness. Low productivity growth may be a problem as far as domestic real incomes are concerned, but the problem has nothing to do with international trade. It would also exist in a closed economy, given the same productivity performance. Indeed, trade allows the effects of low average growth rates to be diminished, provided the rates are uneven across industries producing traded goods. Production will expand in the industries where productivity growth is highest, either to replace imports — if these are import-competing industries — or to expand exports — if these are exporting industries. By allowing a change in weights toward relatively high productivity growth industries, trade reduces the relative loss of income due to poor average productivity growth.

Nothing that I say in the next section is meant to express dissent from the above great insights. These are insights that many who write in the debate about the alleged loss of U.S. competitiveness do not seem to me to keep firmly in view. Nonetheless, there are possibilities that are not captured by this model, and I turn to these in the next section.

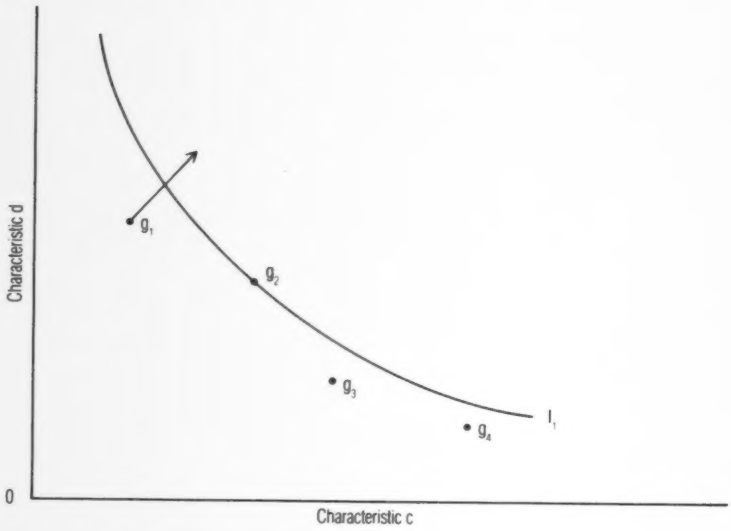
Address Models

The key aspect of address models is that the characteristics that are embodied in goods are taken as the primitive concepts, rather than the goods themselves. Thus, for example, a computer can be viewed as a bundle of characteristics such as memory, speed of computation, ability to draw, and so on. Each good is defined, therefore, by its location in some continuous characteristics space; hence, the appellation address models.

In such models, the set of all possible goods is uncountably infinite, being a continuum in the characteristics space. This formulation requires that the firm choose, out of the infinite possible variety of goods, which goods to design and produce, rather than merely which good to produce out of an already-defined set of possible goods, each of which is distinct from the other.

A commodity group is a set of commodities that embodies a particular group of characteristics. Each commodity in the group has a particular address in the relevant characteristics space. A consumer's tastes are

Figure 1



defined over characteristics, not goods, and the consumer prefers more to less of each characteristic, ***ceteris paribus.***[6]

Discontinuous Effects

Consider first a set of goods each embodying different amounts of two characteristics, c and d. The goods might be computers and the two characteristics speed of calculation and memory capacity. For illustration, let there be the four equally priced goods $g_1, \ldots, g_4$, as shown in Figure 1. Let an individual consumer have tastes such that his or her indifference curve that passes through g_2 is I_1. The consumer buys good g_2 and his or her cross elasticities of demand with the other three goods are zero.

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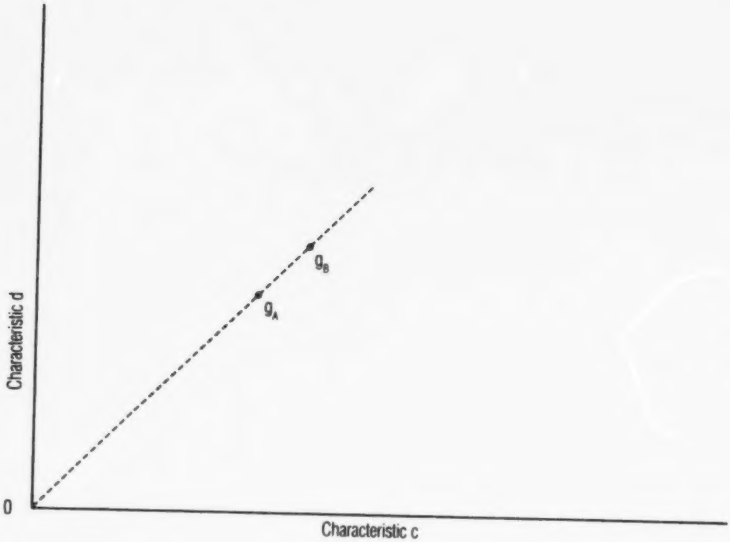
[6] One of the seminal articles in the address approach is K.J. Lancaster, "A New Approach to Consumer Theory," ***Journal of Political Economy*** 74 (1966): 132–157. Eaton and Lipsey's first published work in this area was "The Principle of Minimum Differentiation Reconsidered," ***Review of Economic Studies*** 42 (1975): 27–49.

Figure 2



Now let the quality of g_1 change so that it embodies more of both characteristics (in the computer example, it is faster and has more memory). Its address moves, say, along the path shown by the arrow. These changes have no effect on the consumer shown in Figure 1 until g_1's address crosses the indifference curve I_1. At that point, the consumer switches purchases discretely from g_2 to g_1. Although Figure 1 does not show prices directly, it should be apparent that when g_1's address is in the neighborhood of the curve I_1, the cross elasticity of demand between g_1 and g_2 is infinite.

This illustrates, in a crude way, the type of discontinuity that abounds in address models and, if such models correctly capture the world of differentiated products, in the world as well.

Loss of Competitiveness in Address Models

Now consider Figure 2. Country A is producing a good located at address g_A. (There are other goods at addresses NW and SE of g_A but we do not need to show them.) Now let country B develop a competing product g_B, which embodies the two characteristics in the same ratio but has more of both. For example, its computer may be 10 percent faster and have 10 percent more memory capacity than A's. If the two products sell at the same price, B will capture all of A's sales.

We now consider two cases. First, if this product accounts for only a small proportion of A's exports, the exchange rate will not be much affected by A's loss of sales. In this case, either the price of A's inferior product falls enough to allow it to sell in competition with B's superior product, or the market is completely lost for A. In either situation, some small exchange-rate adjustment may be needed to rebalance trade.

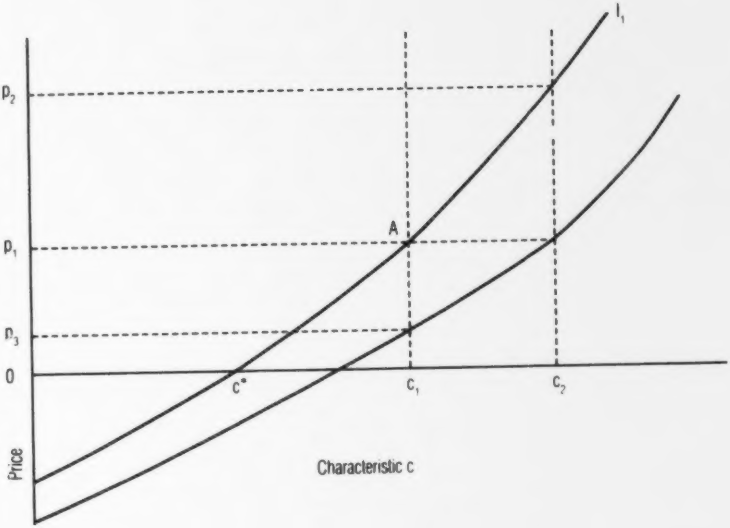
Second, if this product is A's only export (and if money wages and prices do not adjust rapidly in A), then A's exchange rate must fall either until the price differential is sufficient for A to regain some of its lost market or until some other industry develops a comparative advantage and becomes A's new export.

In either of the above cases, major real income losses may result for A as a result of the price adjustments that occur, until A can restore its exports to a sufficient value to equal its imports. These price changes are analyzed in Figure 3.

Since the two goods embody the characteristics in the same proportion, one can compare them by measuring the quantities of either characteristic that they embody. Choose c and plot it on the horizontal axis. On the vertical axis, plot the price of the good. A's good is located at point A with a price of p_1 and a quantity c_1 of the characteristic. The typical consumer's indifference curve passing through A is I_1. (Higher indifference curves lie SE of I_1.) The curve is positively sloped for obvious reasons. It cuts the axis at c^*, where the present value of the difference in the consumer's utility resulting from using the product with characteristic c_1 and the product with characteristic c^* is equal to p_1. (If the consumer is a firm, utility is net revenue.) To the left of c^*, the consumer needs to be paid a subsidy to be made indifferent between using the inferior product and paying p_1 for the use of the product with characteristic c_1. With some goods, of which computers may be an example, the curves will be very steep: having computers 10 percent less efficient than one's competitors' computers is very damaging in some enterprises.

B's product now comes on the market with quantity c_2 of the characteristic. At any price below p_2 for this new product, A's good will lose its market. Let the actual price for B's product be p_1. Now A's price must fall to p_3 if it is to compete. As shown in Figure 3, this is a major price fall, and if p_3 is below A's direct costs, the product will disappear quickly. If it is below A's full costs, then the product will disappear eventually.

Figure 3



If the indifference curve through B cuts the horizontal axis to be right of c_1, there is no positive price at which A can compete.[7]

Note the contrast with the earlier model. There, a poor competitive performance caused a country's costs to fall more slowly than did its competitors' costs, and all that was then needed to restore competitive advantage was a depreciation equal to the difference between the two countries' productivity growth rates.[8] The country's rate of growth of real income was positive and dictated by its own internal rate of productivity growth. (Recall that we have ruled out those changes in the terms of trade that can cause large changes in living standards but that are exogenous to the forces we are studying here.)

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[7] This simplified argument makes use of a representative consumer. If tastes vary among consumers — which is the normal assumption in address models — there will be a pencil of indifference curves through the point (c_1, p_1), one curve for each consumer. The intersections of these curves with the vertical line through c_2 will give the distribution of sales between A's and B's product for various prices of B's product. B will not gain all of the market until its price is below the point of intersection of every curve in the pencil with the vertical from c_2.

[8] This assumes that money wages rise at the same rate in all industries. If wages are productivity geared, no exchange-rate changes are needed — as we saw above.

In the present model, a country can lose the race to place new goods with attractive addresses into a given characteristics space. Even when the product is not greatly inferior, there is no theoretical limit to the amount of price cutting that is required to stay in the market, since this depends on the consumer's willingness to make trade-offs between the technical characteristics of the good and its price.

What this example illustrates is that falling even slightly behind in a race to develop new products in a given characteristics space can bring losses of a magnitude not suggested by the earlier model.

Supernormal Profits in Entry Equilibrium

Chamberlin-type models of differentiated products, as formalized by such economists as Oliver Hart and Perlov and Salop, make use, in one guise or another, of the symmetry assumption: a new product causes the demand for all existing products in that industry to fall by an equal amount.[9] In effect, this means that all existing products are equally good substitutes for each other; each product in a set of differentiated products does not have close and less close substitutes.[10] It is hard to imagine any real world industry where differentiated products would display this symmetry.

In this situation, the effect of free entry is to drive profits (nearly) to zero. The integer problem still means that, because of the nonconvexities needed to explain the existence of firms in the first place, n firms will be able to make profits, while n + 1 firms will incur losses (except where, by chance, the zero-profit output is an integer multiple of the equilibrium outputs of each individual firm). But when n is even moderately large, the integer problem accounts for only small profits at most.

Symmetry is a property that cannot be deduced from address models. Because each product has a unique address in characteristics space, each must have near and distant neighbors. In Figure 1, for example, g_1's nearest neighbor is g_2 and its most distant neighbor is g_4. Address models thus

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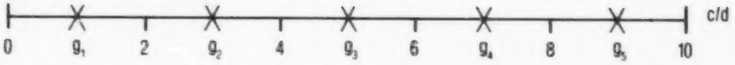
[9] See for example, O.D. Hart, "Monopolistic Competition in a Large Economy with Differentiated Commodities," *Review of Economic Studies* 46 (1979): 1–30; idem, "Monopolistic Competition in the Spirit of Chamberlin: Special Results," *Economic Journal* 95 (1985): 889–908; and J.M. Perloff and S.C. Salop, "Equilibrium with Product Differentiation," *Review of Economic Studies* 52 (1985): 107–120.

[10] Different authors use different behavorial assumptions to produce this result, but operationally all of the assumptions have the same effect. For extended discussion, see B.C. Eaton and R.G. Lipsey, "Product Differentiation," in R. Schmalensee and R. Willig, eds., *Handbook 10: Handbook of Industrial Organization* (Amsterdam: North-Holland, forthcoming).

Figure 4



are models of localized competition. Kaldor[11] refers to overlapping oligopolies as opposed to large group, monopolistic competition.

Now imagine an industry selling products with two characteristics where only the ratio of characteristics matters. For example, the product might be soap powder, where the two characteristics are cleansing power (c) and harshness (d) and are technically related to each other. At one extreme, the good is easy on the hands (c_1) but has low cleaning power (d_2), while at the other extreme the good is harsh on the hands (c_2) but has great cleaning power (d_1).

Figure 4 shows the characteristics space for such products. The space is one dimensional, depending as it does only on the ratio c/d, and its range is assumed arbitrarily to run from 0 to 10. Assume that there is a continuum of identical customers spread evenly along the line according to their most preferred product, and that they buy the product that is closest to the one they prefer. (A consumer's location is unique if, for each common price, the consumer always prefers a product with the same address; that address then locates the consumer's unique preferred product and can be regarded as his or her location.) Finally, assume that the industry has five identically priced products located at the addresses shown by the crosses in Figure 4. Given the assumption about consumers, all firms will have identical market areas stretching halfway to their neighbor (and all the way to the market boundary if they are located on the market periphery). All firms will also have the same sales and profits.

Now let a firm consider locating a new product at point 4, which is in the slot between g_2 and g_3. The new entrant will get one-half the sales enjoyed by g_2 and g_3 before entry. All of its sales will be taken from these two close neighbors and its entry will have no effect on the sales of any other products. No matter how many products are packed into this space, a new entrant will affect the sales of only its two adjacent products and it will obtain sales of only one-half of its neighbors' pre-entry sales.

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[11] Kaldor developed an intuitive, address-model critique of the symmetry assumption early on in the debate. See N. Kaldor, "Mrs. Robinson's Economics of Imperfect Competition", *Economica* 1 (1934): 335–341; and idem, "Market Imperfections and Excess Capacity," *Economica* 2 (1935): 33–50.

This is a typical characteristic of address models. Competition is localized no matter how many products there are in the market, and a new product can expect to get something in the order of one-half the sales of the existing products. This means that if prices are unchanged by entry, the existing firms can be making up to twice the normal rate of return on capital without inducing entry.[12]

Price Changes and Spatial Relocations

There are, of course, many complications to consider before taking these results as predictions about the world. First, price competition needs to be considered. Eaton and Lipsey have shown, however, that price competition does not necessarily drive profits to zero (at least in those cases in which equilibrium exists). Second, the possible relocation of existing firms needs study. The existence of sunk, highly durable capital means that any movement of existing products will not take place for some time. As a result, substantial supernormal profits are consistent with free entry equilibrium in address models — although the maximum value will tend to be somewhat less than twice the competitive rate of return on capital.

Omitted Complications

Many complications have not even been mentioned so far, and before concluding, two important ones should at least be put on record. If there were genuine constant returns to scale and a continuum of consumers spread over the characteristics space, there would also be a continuum of production. To permit the existence of firms, there must be production nonconvexities. These can come from many sources, such as indivisibilities in physical plant, fixed entry costs in terms of product development or other expenses, or fixed advertising costs of establishing a brand image.[13]

The second important set of issues concerns the dynamics of industries in which supernormal profits occur in static equilibrium. Will there really be supernormal profits when the whole life cycle of the industry is taken into account? How easy is it for new firms to break into the market by changing the nature of the space? By adding an important dimension that existing firms do not have, the new entrant can outflank the whole industry and avoid having to fit into a tight slot between existing firms — which is one good reason why new products often seek to add new dimensions to the characteristics space.

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[12] The key result is proven in B.C. Eaton and R.G. Lipsey, "Free Entry and the Existence of Pure Profit," *Economic Journal* 88 (1978): 455–469. Its significance is discussed in Archibald, Eaton, and Lipsey, "Address Models of Value Theory"; and in Eaton and Lipsey, "Product Differentiation."

[13] One of the best discussions of the necessity for nonconvexities in manufacturing is in N. Kaldor, "The Irrelevence of Equilibrium Analysis," *Economic Journal* 82 (1972): 1237–1255.

These and many other similar issues are important and are under active investigation by theorists. In the meantime, it remains true that the insights offered by address models are somewhat different from those of nonaddress models. If goods really have identifiable characteristics on which all consumers more or less agree, address models may be the superior way to model differentiated products. If nothing else, it prevents one from making assumptions in nonaddress models that have no conceivable underpinnings in characteristics space. For example, the symmetry assumption cannot apply to a set of differentiated products for which address formulations are a correct characterization.

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- *Tax Reform in a New Light*, C.D. Howe Institute Commentary no. 13, by Robert D. Brown (January 1987).
- *Confronting Global Challenges*, Policy Review and Outlook, 1987, by Edward A. Carmichael (December 1986).
- *Ontario's Proposals for the Canadian Securities Industry*, Observation no. 29, by Thomas J. Courchene, with John D. Todd and Lawrence P. Schwartz (November 1986).
- *Monetary Policy in Transition: A Study of Bank of Canada Policy, 1982–85*, Policy Study no. 1, by Peter Howitt (October 1986).
- *Staying on Course*, C.D. Howe Institute Commentary no. 12, by Peter F. Bartha (October 1986).
- *Closing a Trade Deal: The Provinces' Role*, C.D. Howe Institute Commentary no. 11, by Murray G. Smith (August 1986).
- *New Stresses on Confederation: Diverging Regional Economies*, Observation no. 28, by Edward A. Carmichael (June 1986).
- *Taking the Initiative: Canada's Trade Options in a Turbulent World*, Observation no. 27, by Richard G. Lipsey and Murray G. Smith (May 1985).